Lake Yale and Trout Lake Hydrologic / Nutrient Budgets and Water Quality Management Plans

Draft Final Report – April 2017

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SECTION 1

INTRODUCTION

This report provides a summary of work efforts performed by Environmental Research & Design, Inc. (ERD) for the Lake County Water Authority (LCWA) to develop hydrologic and nutrient budgets and water quality management plans for Trout Lake and Lake Yale, relatively shallow eutrophic waterbodies located in Lake County, Florida. Each of the two waterbodies was originally included on the verified list of Impaired Waters for the Ocklawaha Basin that was adopted by secretarial order on August 28, 2002, with Trout Lake listed as impaired for nutrients and dissolved oxygen, and Lake Yale listed as impaired for nutrients.

Total maximum daily load (TMDL) evaluations were developed for each of the two lakes and adopted by rule on August 14, 2003. Nutrient loadings to each lake were calculated for surface inflows, precipitation, dry deposition, industrial waste discharge (if applicable), and estimates of loadings from failed septic tanks located within 600 ft of the lake shoreline. However, neither of the two TMDL studies evaluated nutrient loadings originating from groundwater seepage or internal recycling, which often exceeds runoff generated nutrient loadings in hypereutrophic lakes. This study is intended to re-evaluate and verify the previously identified inputs, while supplementing the analyses to include shallow groundwater seepage and internal recycling.

Both Trout Lake and Lake Yale are part of the Upper Ocklawaha Chain-of-Lakes which begins south of Lake Apopka in Orange County and extends to areas north of Lake Yale in Marion County. Trout Lake and Lake Yale are located on the downstream portions of the Chain-of-Lakes, ultimately discharging to Lake Griffin and the Palatlakaha River. An overview of the Upper Ocklawaha Chain-of-Lakes is given in Figure 1-1.

1.1 Trout Lake

1.1.1 Waterbody Description

An overview of Trout Lake, including significant inflows and outflows, is given on Figure 1-2. Trout Lake is located in Lake County, north of the City of Eustis. Trout Lake has a surface area of approximately 106 acres, with a mean depth of about 10 ft. The lake is hydrologically connected to Lake Eustis through a free-flowing canal located on the southwest corner of Trout Lake, and water levels in Trout Lake are determined, at least partially, by water elevations in Lake Eustis. The watershed area discharging to Trout Lake is extremely large in relation to the size of the lake, containing approximately 3,667 acres of agricultural, residential, and urban land uses.

For assessment purposes, the State of Florida has been divided into waterbody assessment polygons that are identified using Waterbody IDs and are referenced to as WBIDs, and Trout Lake is part of WBID 2819A. Trout Lake is classified as a Class III waterbody with designated uses of recreation and propagation of a healthy, well-balanced population of fish and wildlife.

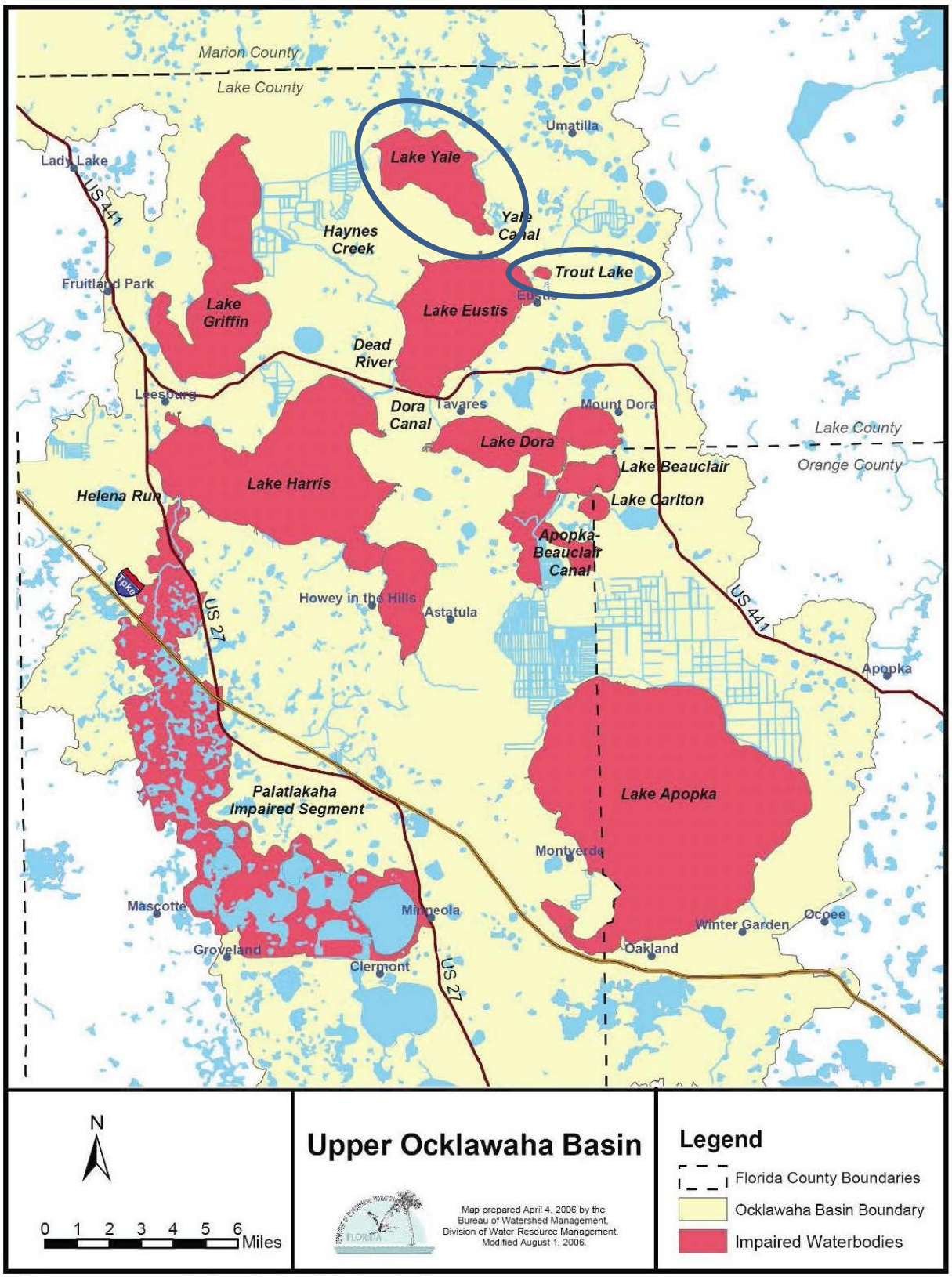


Figure 1-1. Upper Ocklawaha Chain-of-Lakes. (Source: FDEP, 2006)



Figure 1-2. Overview of Trout Lake.

1.1.2 Impaired Waters Designation

Section 303(d) of the Clean Water Act (CWA) requires states to submit lists of surface waterbodies that do not meet applicable water quality standards. These waterbodies are identified as "impaired waters" and Total Maximum Daily Loads (TMDLs) must be established for these waters on a priority schedule. The Florida Department of Environmental Protection (FDEP) has established a series of guidelines to identify impaired waters which require the establishment of TMDLs. Waterbodies within the State of Florida have been divided into five separate groups for planning purposes, with Trout Lake located in the Lake Harris Unit of the Ocklawaha Basin in Group 1. Trout Lake was included on the verified list of impaired waters for the Ocklawaha Basin that was adopted by secretarial order on August 28, 2002, and was listed as impaired for nutrients. FDEP states that the limiting nutrient for the lake is nitrogen based upon a median TN/TP ratio of 8.6 during the 10-year verified period. Trout Lake was de-listed from FDEP's verified list when a nutrient TMDL was adopted. FDEP used historical monitoring data to calculate annual trophic state index (TSI) values for Trout Lake over a 10-year period from 1995-2004, and 9 of the 10 annual TSI values exceeded the established threshold of 60.

A Final TMDL was adopted by rule for Trout Lake on January 4, 2006, and Trout Lake was dropped from the FDEP verified list. The TMDL document identifies three separate sub-basin areas which discharge to Trout Lake which are identified as the Trout Lake Sub-basin (TL), Pine Meadows Sub-basin (PM), and the Spring Hill Sub-basin (SH), with a combined area of 3,667 acres for the three watersheds. The annual total nitrogen loading to Trout Lake is estimated to be 10,595 kg/yr (24,165 lbs/yr), of which approximately 98% is contributed by watershed loadings. Average annual total phosphorus loadings into Trout Lake are estimated to be approximately 1,081 kg/yr (2,603 lbs/yr), of which 97% is contributed by watershed loadings. The TMDL document concludes that a 60% reduction in total nitrogen and an 80% reduction in total phosphorus loadings are required to achieve the target TSI for Trout Lake of 54 which is five units about the background TSI of 49 established by FDEP.

1.1.3 Previous Studies

One of the earliest studies conducted on Trout Lake was a biological assessment of the lake conducted by FDEP based upon benthic macroinvertebrate monitoring conducted on October 28, 1996. This document, titled “Eco Summary – Trout Lake Near Eustis, Lake County” provides a discussion of macroinvertebrate communities identified by taking petite Ponar grabs at 12 different locations throughout the lake. The FDEP data suggested that the macroinvertebrate community in Trout Lake is in poor shape, with few macroinvertebrate taxa and a large dominance by the aquatic worm *Chaoborus punctipennis*.

In 1995, the SJRWMD developed external nutrient budgets and an interim Pollutant Load Reduction Goal (PLRG) for phosphorus (Fulton, 1995a) for lakes in the Upper Ocklawaha River Basin based upon trophic state modeling. PLRGs represent estimated reductions in stormwater generated pollutant loadings needed to preserve or restore beneficial uses of receiving waters. Fulton (1995a) reported that nutrient loadings were divided among a number of sources, and identified runoff from upland agriculture as the major source of both nitrogen and phosphorus loading to Lake Yale. During the period from 1984-1985, the agricultural loadings were primarily from pasture and citrus. However, following freezes in the mid-1980s, the citrus acreage declined and other agricultural loadings increased. Runoff from natural areas was also identified as a major source of nutrients to the lake.

Trout Lake was also included in the 2003 study by Fulton, et al. titled “Interim Pollutant Load Reduction Goals for Seven Major Lakes in the Upper Ocklawaha River Basin”, conducted by SJRWMD which included estimates of identified nutrient loadings to Trout Lake and load reduction goals to achieve the target TSI value for the lake.

1.2 Lake Yale

1.2.1 Waterbody Description

An overview of Lake Yale is given on Figure 1-3. Lake Yale is a 4,044 acre eutrophic shallow lake, located in Lake County, with an average water depth of approximately 3.7 m. Surface outflow from the lake occurs periodically through the Yale Canal into Lake Griffin. Discharge rates and water elevations in Lake Yale are partially controlled by a fixed crest weir located in the outfall canal. Lake Yale is identified by FDEP as WBID 2807A which is located in the Lake Griffin Unit of the Ocklawaha Basin in Group 1. Lake Yale is classified as a Class III waterbody with designated uses of recreation and propagation of a healthy, well-balanced population of fish and wildlife. The watershed area of Lake Yale is largely undeveloped, consisting primarily of agriculture, wetlands, and natural land. The TMDL document indicates a drainage basin of approximately 15,394 acres (Fulton, et al., 2003).



Figure 1-3. Overview of Lake Yale.

1.2.2 Impaired Waters Designation

For planning purposes, Lake Yale is located in the Lake Griffin Unit of the Ocklawaha Unit in Group 1. Lake Yale was included on the verified list of impaired waters for the Ocklawaha Basin in Group 1 that was adopted by secretarial order on August 28, 2002, with the cause of impairment listed as nutrients. FDEP indicates that Lake Yale is a phosphorus-limited system based on a median TN/TP ratio of 64 during the verified period. Lake Yale was de-listed from FDEP's verified list when a nutrient TMDL was adopted by rule on August 14, 2003.

The water quality targets for Lake Yale were established by the St. Johns River Water Management District (SJRWMD) based upon estimates of average annual nitrogen and phosphorus loadings to Lake Yale over the period from 1991-2000. Phosphorus inputs were quantified from watershed sources, atmospheric contributions, failed septic tanks, and from domestic and wastewater facilities. The mean annual total phosphorus loading over the period from 1991-2000 was estimated at 1,432 kg, with approximately 41% contributed by watershed loadings. The estimated annual nitrogen loadings to Lake Yale from 1991-2000 are 23,079 kg/yr, of which approximately 34% is contributed by watershed loadings. SJRWMD identified a target in-lake phosphorus concentration of 20 μg/l which would result in an in-lake TSI value less than 50. It was concluded that phosphorus is the limiting nutrient in Lake Yale, and a 10% reduction in phosphorus loadings is necessary to reduce the in-lake TSI to less than 50.

1.2.3 Previous Studies

Several previous studies have been conducted regarding nutrient loadings and water quality in Lake Yale. During 1995, SJRWMD released Technical Publication SJ95-6 titled "External Nutrient Budget and Trophic State Modeling for Lakes in the Upper Ocklawaha River Basin" (Fulton, 1995). This document provides external nutrient budgets for each of the Upper Ocklawaha River Basin lakes and includes drainage basin boundaries, land use characterization, estimation of runoff volumes and loadings, and trophic state modeling to corroborate the identified loading inputs.

An additional study was conducted by Fulton, et al. (2003) titled "Interim Pollutant Load Reduction Goals for Seven Major Lakes in the Upper Ocklawaha River Basin" for SJRWMD. This document consists of an expansion of the 1995 study, identifies both hydrologic and nutrient loadings to Lake Yale over the period from 1991-2000, and recommends pollutant load reduction goals to achieve water quality targets in each of the evaluated lakes. Sources included runoff from land uses such as residential, commercial, industrial, mining, open land/recreational, muck farms, pastures, croplands, silviculture, wetlands, and other agriculture. Atmospheric contributions from wet and dry deposition directly on the lake surface were accounted for based upon measurements in the basin. The mean annual total phosphorus load over this period was estimated at 1,432.4 kg. The three major sources for phosphorus were dry deposition (25.94%), precipitation (19.74%), and wetlands (14.59%). In this evaluation, pasture, cropland, feeding operations, and other agricultural activities represented approximately 5% of the annual average phosphorus. Total nitrogen was estimated at 23,078.7 kg/yr, with precipitation accounting for approximately 42% of the total load. Permitted industrial or domestic wastewater sources represented less than 4% of the phosphorus load and less than 2% of the nitrogen load to the lake. This 2003 report forms the basis for the TMDL document titled "Total Maximum Daily Load for Total Phosphorus for Lake Yale and Yale Canal, Lake County, Florida" issued by FDEP, dated August 14, 2003.

During 2008, a study was completed by Inwood Consulting Engineers for Lake County Public Works, titled "Lake Yale Basin Study" which was designed to identify and reduce stormwater-based phosphorus loadings to Lake Yale. Inwood conducted an inventory of existing drainage systems and structures associated with Lake Yale, developed a pollutant loading model to identify priority areas within the Lake Yale Basin, and developed conceptual designs for selected improvement projects. Priority projects were identified as a result of the Lake Yale Basin study which were identified as Old Chisholm Trail Stormwater Improvements and Washington Avenue Drainage Improvements.

1.3 Work Efforts Performed by ERD

Work efforts for this project were initiated by ERD during February 2015. The primary objectives of this project are to quantify and rank hydrologic and pollutant loadings to Trout Lake and Lake Yale, and to identify potential water quality improvement projects. Field monitoring was conducted by ERD in each of the two lakes from March 2015-October 2016 to collect hydrologic and water quality data for use in developing hydrologic and nutrient budgets for each lake and identify opportunities for load reductions. The hydrologic budgets include inputs from bulk precipitation, stormwater runoff, inflow from interconnected lakes and canals, and groundwater seepage. The nutrient budgets include inputs from bulk precipitation, stormwater runoff, inflows from interconnected lakes and canals, groundwater seepage, and internal recycling. A detailed evaluation of sediment characteristics was also conducted in Trout Lake

and Lake Yale which included physical and chemical characterization of surficial sediments and evaluation of internal phosphorus recycling. Bathymetric maps of water and muck depth were also developed, along with estimates of water and muck volume within each of the two lakes. Water quality improvement projects were identified and evaluated, and recommendations are provided for water quality improvement options.

This report has been divided into nine separate sections for presentation of the work efforts performed by ERD. Section 1 provides an introduction to the report, a brief overview of the characteristics of Trout Lake and Lake Yale, and an overview of work efforts performed by ERD. Current characteristics of Trout Lake and Lake Yale are discussed in Section 2, including lake bathymetry, sediment accumulation and characteristics, and current and historical water quality. A discussion of the drainage basin areas is given in Section 3, and the hydrologic budgets are presented in Section 4. Nutrient budgets, which include inputs from total nitrogen, total phosphorus, and TSS, are given in Section 5. A discussion of the nutrient limitation water quality models developed for the two lakes is given in Section 6. Recommendations for water quality improvement options are provided in Section 7, and cited references are provided in Section 8. Appendices are also attached which contain technical analyses used to support the information contained within the report.

SECTION 2

PHYSICAL AND CHEMICAL CHARACTERISTICS OF TROUT LAKE AND LAKE YALE

This section provides a discussion of the physical and chemical characteristics of Trout Lake and Lake Yale, including lake bathymetry, sediment characteristics, and current and long-term water quality characteristics. This information is based upon available historical data for Trout Lake and Lake Yale, along with a field monitoring program conducted by ERD from March 2015-October 2016.

2.1 Physical Characteristics

2.1.1 Bathymetric Monitoring Techniques

Bathymetric surveys of Trout Lake and Lake Yale were conducted by ERD during February-March 2015 to evaluate water column depth as well as thickness of unconsolidated sediments within each lake. Measurements of water depth and sediment thickness were conducted at 52 individual sites in Trout Lake and at 206 sites in Lake Yale. Probing locations used for the bathymetric study are indicated on Figure 2-1 for Trout Lake and on Figure 2-2 for Lake Yale. Each of the data collection sites was identified in the field by longitude and latitude coordinates using a portable Garmin GPS device. The field crew could not access the southeast tip of Lake Yale due to dense vegetation growth in this area.

Water depth at each of the data collection sites was determined by lowering a 20-cm diameter Secchi disk attached to a graduated line until resistance from the sediment layer was encountered. The depth on the graduated line corresponding to the water surface was recorded in the field and is defined as the water depth at each site. After measurement of the water depth at each site, a 1.5-inch graduated aluminum pole was then lowered into the water column and forced into the sediments until a firm bottom material, typically sand or clay, was encountered. The depth corresponding to the water surface is defined as the depth to the firm lake bottom. The difference between the depth to the firm lake bottom and the water depth at each site is defined as the depth of unconsolidated sediments.

The generated field data were converted into bathymetric maps for both water depth and unconsolidated sediment depth in Trout Lake and Lake Yale using AutoCAD 2007. Estimates of water volume and unconsolidated sediment volume within Trout Lake and Lake Yale were generated using the Autodesk Land Desktop 2007 Module.

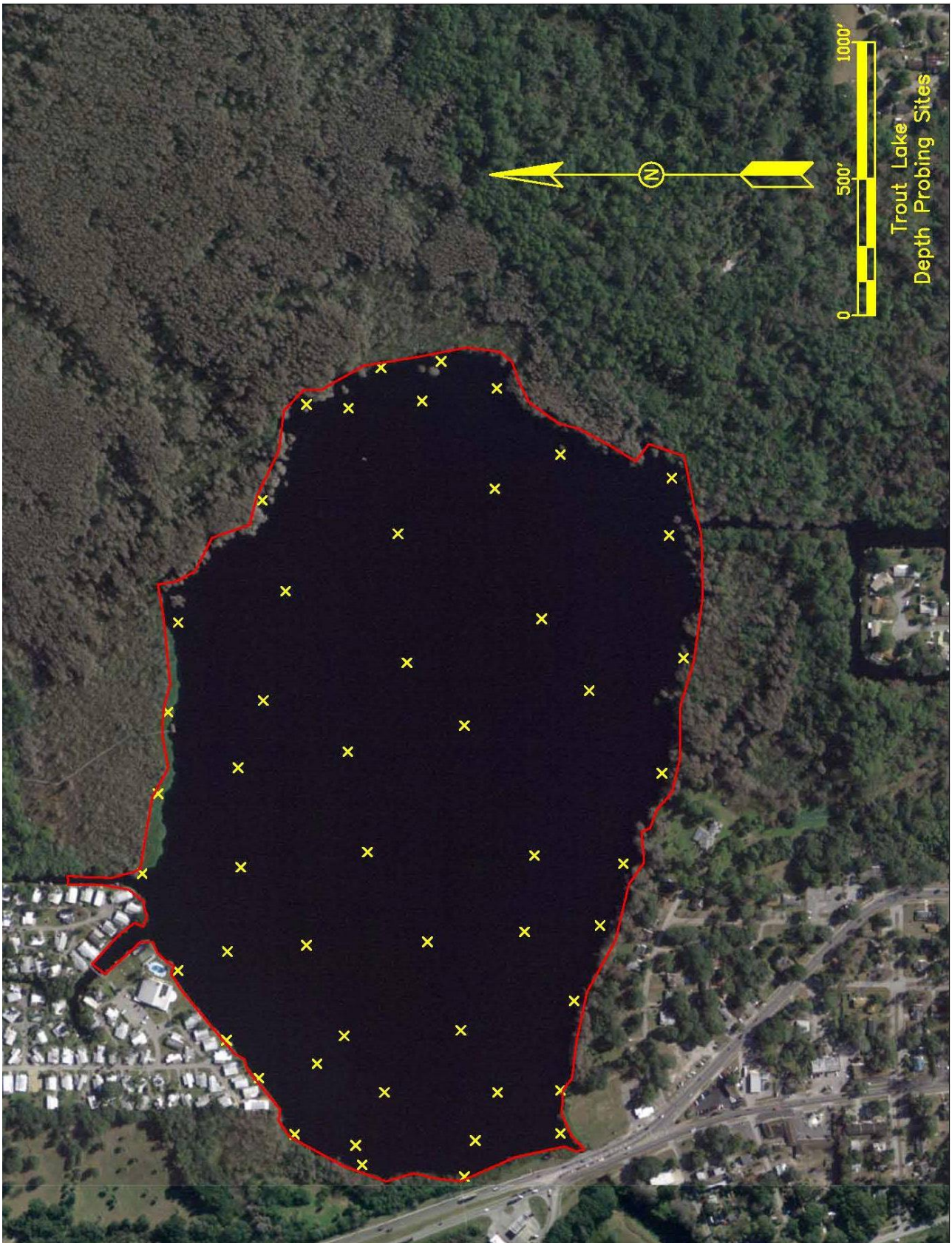


Figure 2-1. Probing Locations for Water and Muck Depths in Trout Lake (March 18, 2015)

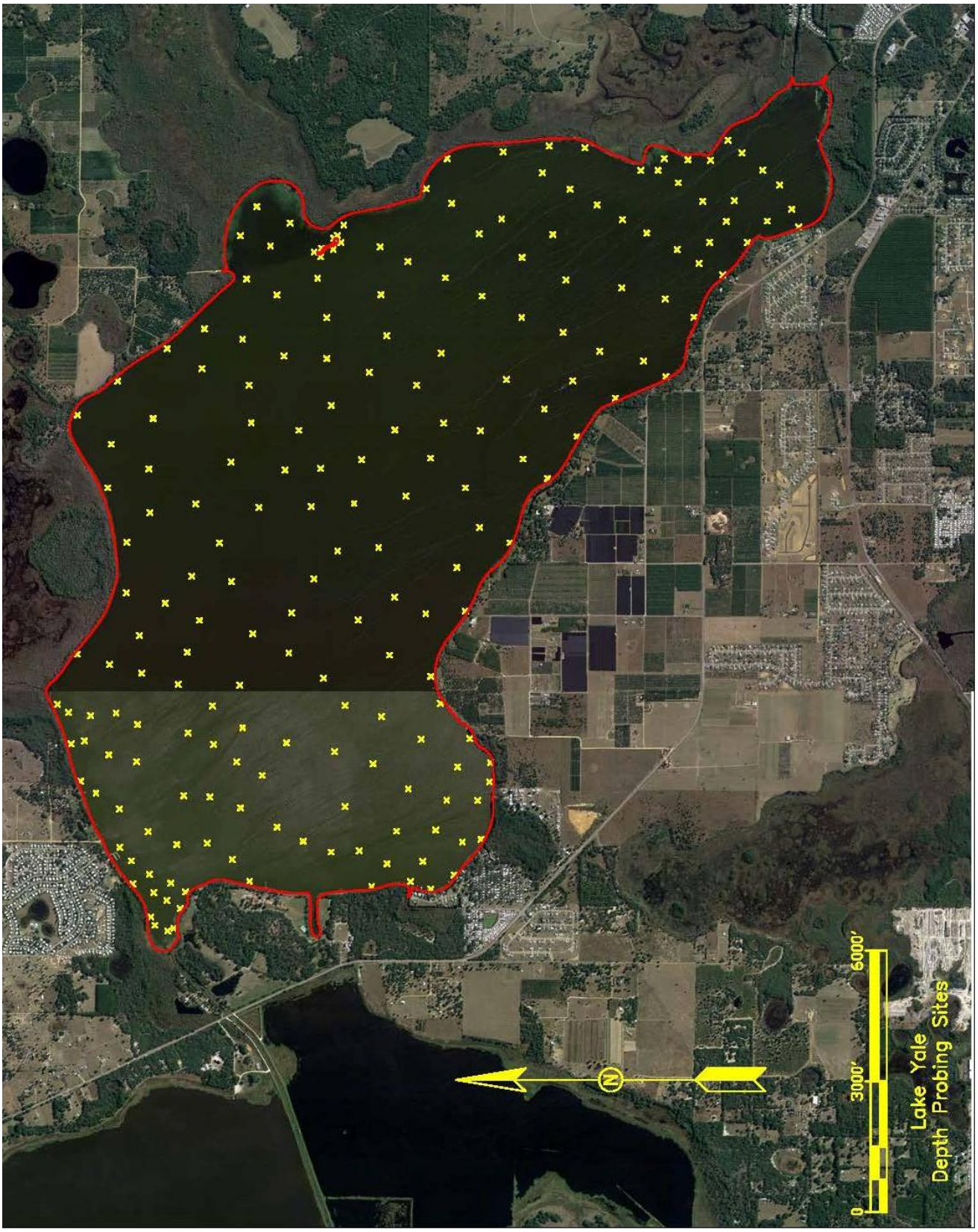


Figure 2-2. Probing Locations for Water and Muck Depths in Lake Yale (March 16 and 26, 2015)

2.1.2 Trout Lake

A water depth contour map for Trout Lake, based upon the field monitoring performed by ERD, is given in Figure 2-3. The western, northern, and southern shorelines of Trout Lake appear to be moderately steep, sloping to a water depth of approximately 9-11 ft. In contrast, the eastern shoreline of Trout Lake appears to have a relatively mild slope, with a gradual transition to the maximum lake depth at approximately 9-11 ft. The bathymetric signature indicated on Figure 2-3 suggests that Trout Lake originated as a result of a large sinkhole feature, concentrated primarily in western-central portions of the lake.

Stage-area-volume relationships for Trout Lake are summarized in Table 2-1 based on the bathymetric survey performed by ERD. There is no existing staff gauge in Trout Lake, so the water level was estimated based on the level in Lake Eustis which is hydrologically connected to Trout Lake by a navigable canal. The water level in Lake Eustis on March 18, 2015 was 62.23 and this is assumed to be the water level in Trout Lake as well. At the assumed water surface elevation of 62.23 ft present on March 18, 2015, the lake surface area is approximately 106 acres. The lake volume at this surface area is 806 ac-ft which corresponds to a mean water depth of approximately 7.6 ft. This value is relatively shallow for a Central Florida lake. A summary of bathymetric characteristics of Trout Lake is given in Table 2-2.

TABLE 2-1

DEPTH-AREA-VOLUME RELATIONSHIPS FOR TROUT LAKE
(Water Elevation = 62.23 ft)

WATER DEPTH (ft)	AREA (acres)	VOLUME (ac-ft)	WATER DEPTH (ft)	AREA (acres)	VOLUME (ac-ft)
0	106	806	6	76.7	239
1	103	701	7	66.9	167
2	99.6	600	8	56.9	105
3	91.6	502	9	45.9	54
4	91.6	408	10	26.4	17
5	85.1	320	11	8.4	0

TABLE 2-2

BATHYMETRIC CHARACTERISTICS OF TROUT LAKE

BATHYMETRIC PARAMETER[1]	UNITS	VALUE
Surface Area	acres	106
Total Volume	ac-ft	806
Mean Depth	ft	7.6
Maximum Depth	ft	> 11
Shoreline Length	ft miles	9,650 1.83

1. Based upon a water surface elevation of 62.23 ft

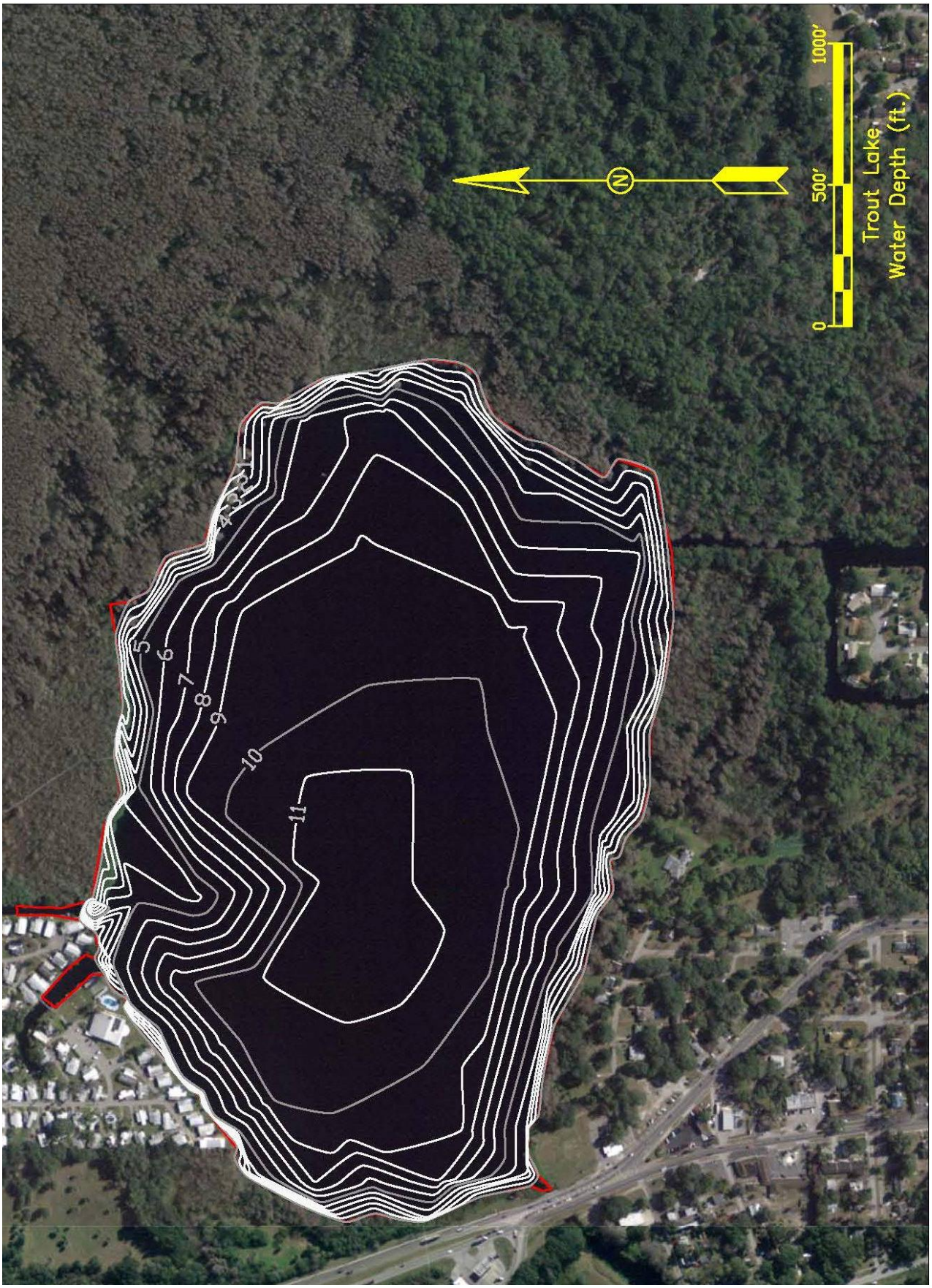


Figure 2-3. Water Depth Contours for Trout Lake (March 18, 2015; Water Elevation = 62.23 ft).

A bathymetric contour map of the depth of unconsolidated organic sediments in Trout Lake is given in Figure 2-4. The deepest accumulation of organic muck is present in the central portion of the lake where maximum muck depth exceeds 7 ft. Most shoreline areas of the lake have muck depths of approximately 0-1 ft, although accumulations appear to be less near the wetland inflows along the east end of the lake and near the lake outfall on the southwest side of the lake. More than half of the lake appears to have muck depths of 1 ft or more.

Estimates of area-volume relationships for organic muck accumulations in Trout Lake are given in Table 2-3. Approximately 68 acres (64%) of the lake area have existing muck accumulations ranging from 0-1 ft in depth, with 18% of the lake bottom covered by muck accumulations ranging from 1-2 ft in depth, and 13% ranging from 2-3 ft in depth. Overall, Trout Lake contains approximately 233 ac-ft (375,907 yd^3) of unconsolidated organic sediments. The volume of unconsolidated sediment in Trout Lake is sufficient to cover the entire lake bottom to a depth of approximately 2.2 ft, a value slightly higher than commonly observed by ERD in eutrophic Central Florida lakes.

TABLE 2-3

DEPTH-AREA-VOLUME RELATIONSHIPS FOR ORGANIC MUCK IN TROUT LAKE

MUCK DEPTH (ft)	AREA (acres)	CUMULATIVE VOLUME (ac-ft)	MUCK DEPTH (ft)	AREA (acres)	CUMULATIVE VOLUME (ac-ft)
0	106	233	4	18	18
1	68	145	5	7	5
2	49	87	6	2	1
3	35	45	7	0	0

2.1.3 Lake Yale

A water depth contour map for Lake Yale, based upon the field monitoring performed by ERD, is given in Figure 2-5. The western, southwestern, and northwestern shorelines of Lake Yale appear to be relatively steep, sloping rapidly to water depths of 10-15 ft. In contrast, the eastern and southeastern portions of Lake Yale appear to have a milder slope, with a gradual transition to the maximum lake depth at approximately 10-15 ft. The bathymetric signature indicated on Figure 2-5 suggests that Lake Yale originated as a result of one or more large sinkhole features.

An interesting bathymetric feature was observed by ERD on the south-central shoreline of the lake where the shoreline areas slope steeply into a linear depression with a water depth of approximately 21 ft which is more than 5 ft deeper than maximum water depths exhibited in other portions of the lake. This bathymetric signature suggests that this portion of Lake Yale may have been dredged at one time to obtain sand and soil for upland areas. The deep trench area appears to be approximately 2,000 ft in length based upon the scale provided at the bottom of Figure 2-5. Central portions of Lake Yale are relatively flat, with water depths ranging from approximately 12-16 ft. An additional smaller depressional area is also located in Lake Yale along the southern shoreline, approximately half-way between the middle of the southern shoreline and the southeast cove. This area has water depths extending to approximately 16 ft and may have resulted from a small individual sinkhole feature.

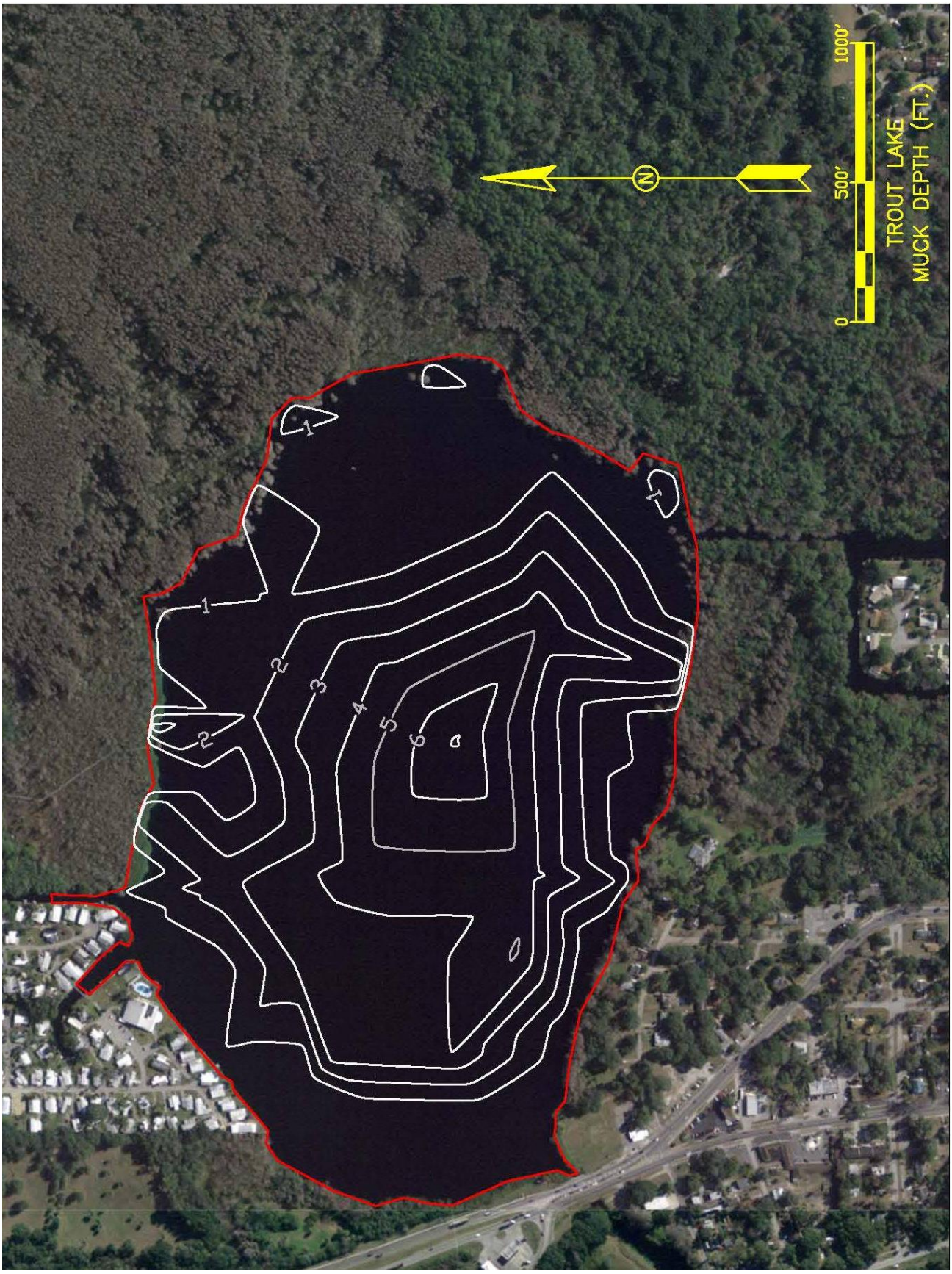


Figure 2-4. Muck Depth Contours for Trout Lake (March 18, 2015).

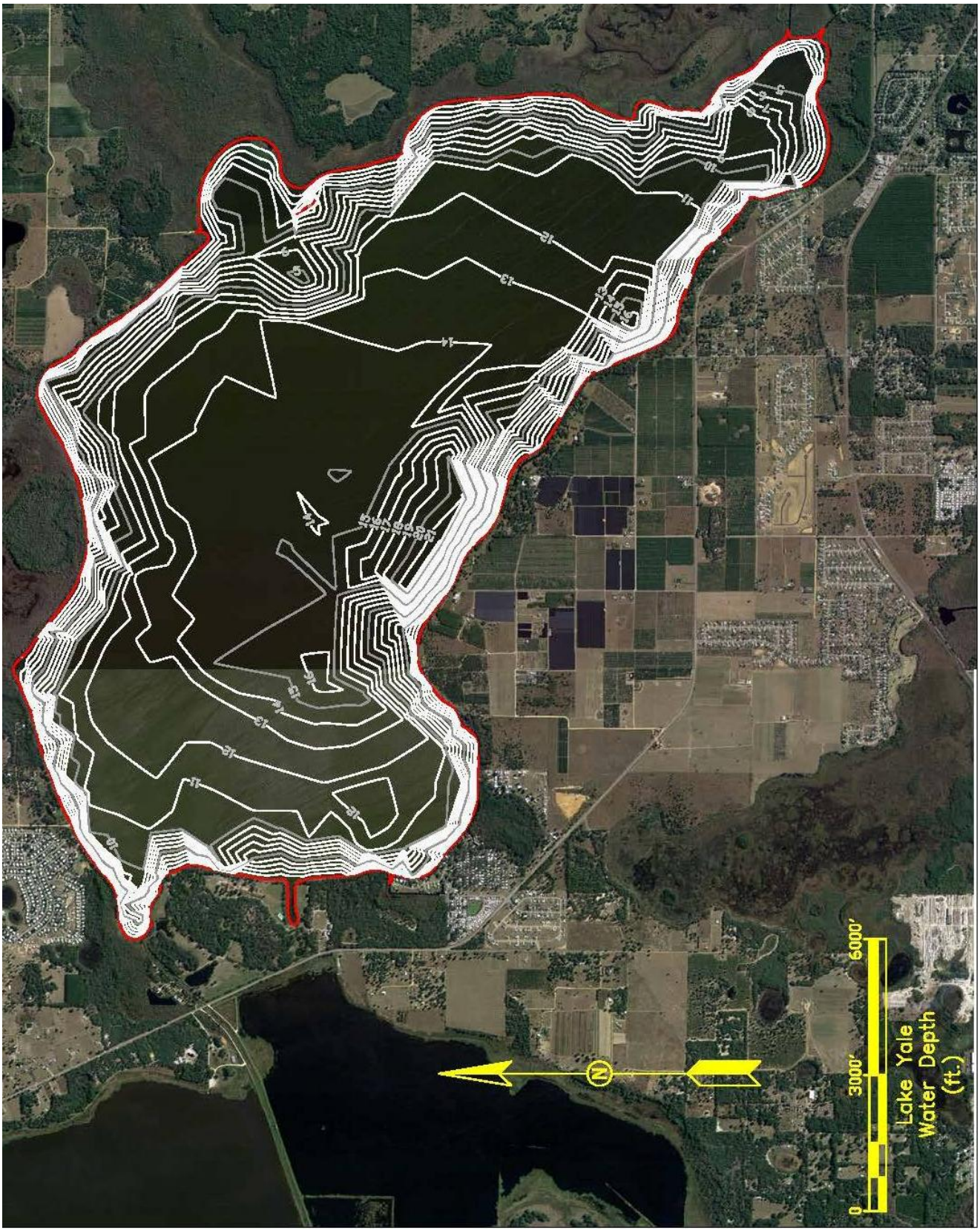


Figure 2-5. Water Depth Contours for Lake Yale (March 16, 2015; Water Elevation = 56.24 ft).

Stage-area-volume relationships for Lake Yale are summarized in Table 2-4 based on the bathymetric survey performed by ERD. Field monitoring in Lake Yale was conducted on March 16 and 26, 2015, and the water surface elevation (based on the staff gauge located on the northwest corner of the lake at the end of Thomas Boat Landing Road) was 56.24 ft on each data collection day. At the water surface elevation of 56.24 ft, the lake surface area is approximately 4,012 acres. The lake volume at this surface area is 43,094 ac-ft which corresponds to a mean water depth of approximately 10.7 ft which is a typical value for a Central Florida lake. A summary of bathymetric characteristics of Lake Yale is given in Table 2-5.

TABLE 2-4

DEPTH-AREA-VOLUME RELATIONSHIPS FOR LAKE YALE
(Water Elevation = 56.24 ft)

WATER DEPTH (ft)	AREA (acres)	VOLUME (ac-ft)	WATER DEPTH (ft)	AREA (acres)	VOLUME (ac-ft)
0	4,012	43,094	12	1,959	4,114
1	3,916	39,130	13	1,429	2,420
2	3,817	35,263	14	976	1,217
3	3,710	31,499	15	290	584
4	3,591	27,849	16	153	362
5	3,451	24,328	17	108	232
6	3,278	20,963	18	80.0	138
7	3,147	17,750	19	54.8	70.6
8	3,020	14,667	20	31.4	27.5
9	2,876	11,719	21	11.7	6.0
10	2,725	8,918	22	0.2	0
11	2,462	6,325			

TABLE 2-5

BATHYMETRIC CHARACTERISTICS OF LAKE YALE

BATHYMETRIC PARAMETER[1]	UNITS	VALUE
Surface Area	acres	4,012
Total Volume	ac-ft	43,094
Mean Depth	ft	10.7
Maximum Depth	ft	> 22
Shoreline Length	ft miles	70,871 13.4

1. Based upon a water surface elevation of 56.24 ft

A bathymetric contour map of the depth of unconsolidated organic sediments in Lake Yale is given in Figure 2-6. Accumulated pockets of organic muck are present throughout the entire lake, with muck depths ranging from 1-14 ft. Muck depths of approximately 0-1 ft were observed along most of the shoreline areas, and approximately half of the lake appears to have muck depths of 8 ft or more.

Estimates of area-volume relationships for organic muck accumulations in Lake Yale are given in Table 2-6. Approximately 2,994 acres (75%) of the lake area have existing muck accumulations ranging from 0-1 ft in depth, with 7% of the lake bottom covered by muck accumulations ranging from 1-2 ft in depth, and 6% ranging from 2-3 ft in depth. Overall, Lake Yale contains approximately 20,725 ac-ft (33,436,333 yd^3) of unconsolidated organic sediments. The volume of unconsolidated sediment in Lake Yale is sufficient to cover the entire lake bottom to a depth of approximately 5.2 ft, a value substantially greater than commonly observed by ERD in Central Florida lakes, and one of the deepest mean muck accumulations ever measured by ERD.

TABLE 2-6

DEPTH-AREA-VOLUME RELATIONSHIPS FOR ORGANIC MUCK IN LAKE YALE

MUCK DEPTH (ft)	AREA (acres)	CUMULATIVE VOLUME (ac-ft)	MUCK DEPTH (ft)	AREA (acres)	CUMULATIVE VOLUME (ac-ft)
0	4,012	20,725	8	1,245	2,047
1	2,994	17,222	9	809	1,020
2	2,732	14,359	10	439	396
3	2,511	11,737	11	150	102
4	2,304	9,329	12	20.4	17
5	2,091	7,132	13	6.1	4
6	1,847	5,163	14	1.0	0
7	1,570	3,455			

2.2 Sediment Characteristics

2.2.1 Sediment Collection

Sediment core samples were collected in Trout Lake and Lake Yale by ERD to evaluate the characteristics of existing sediments and potential impacts on water quality within the lakes. Sediment core samples were collected at 15 separate locations within Trout Lake on January 29, 2015 by ERD personnel. Locations of sediment sampling sites in Trout Lake are illustrated on Figure 2-7. Based on the lake surface area of 106 acres, sediment samples were collected at a rate of one sample for every 7.1 acres of lake area.

Sediment core samples were collected at 32 separate locations within Lake Yale on March 18, 2015 by ERD personnel. Locations of sediment sampling sites in Lake Yale are illustrated on Figure 2-8. Based upon the lake surface area of 4,012 acres, sediment samples were collected at a rate of 1 sample for every 125 acres of lake area.

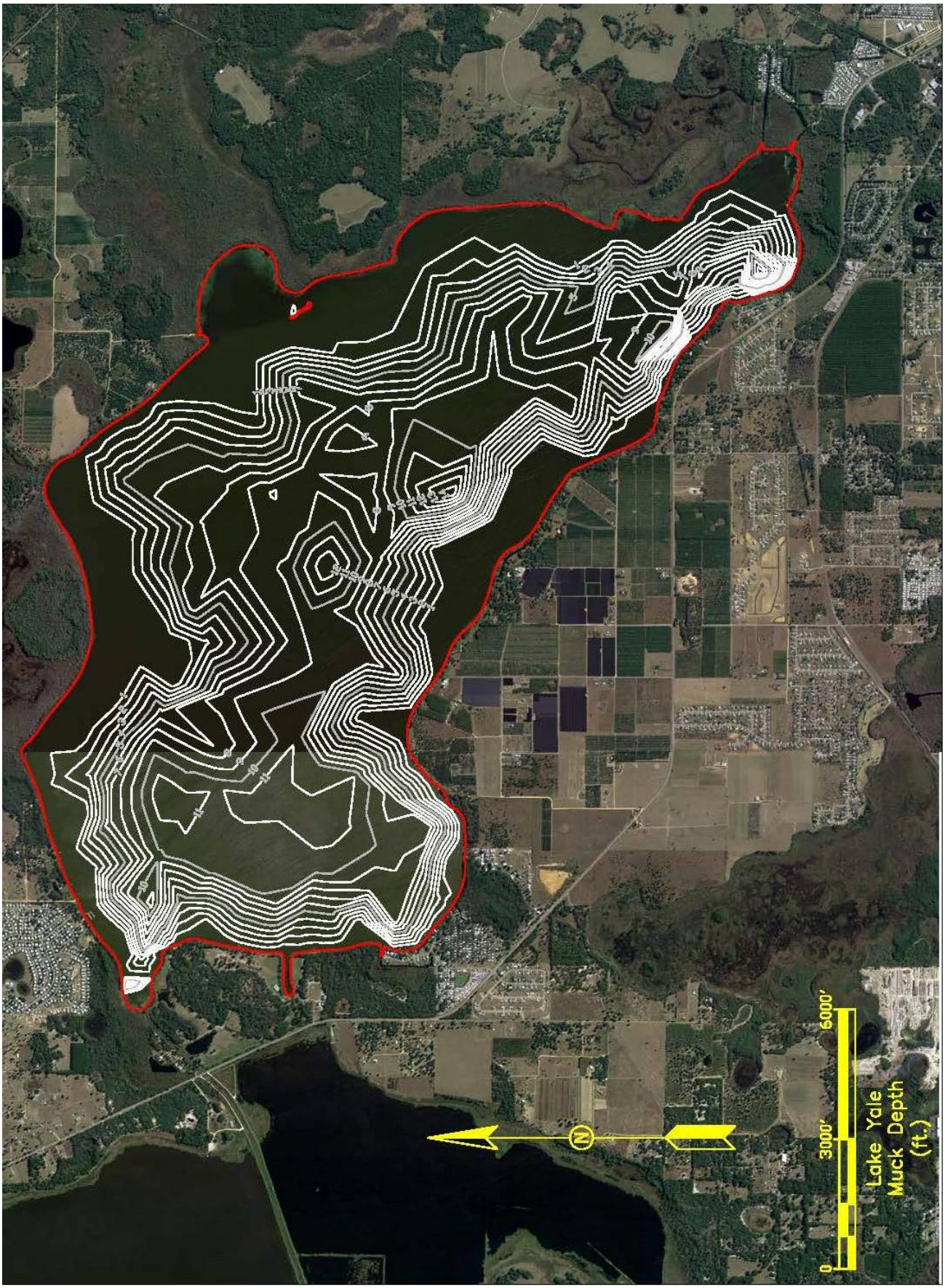


Figure 2-6. Muck Depth Contours for Lake Yale (June 13, 2015).

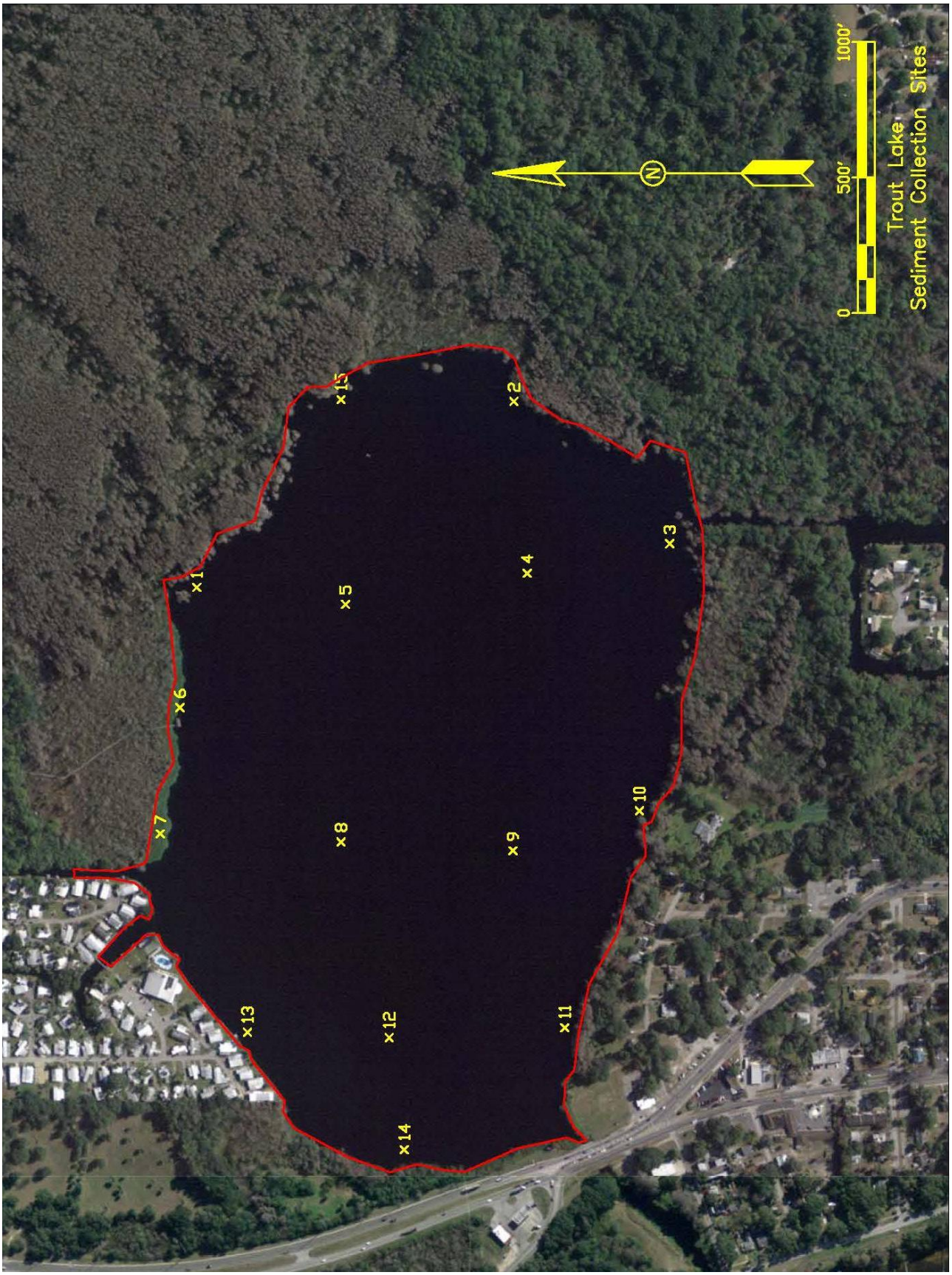


Figure 2-7. Sediment Core Collection Sites in Trout Lake.

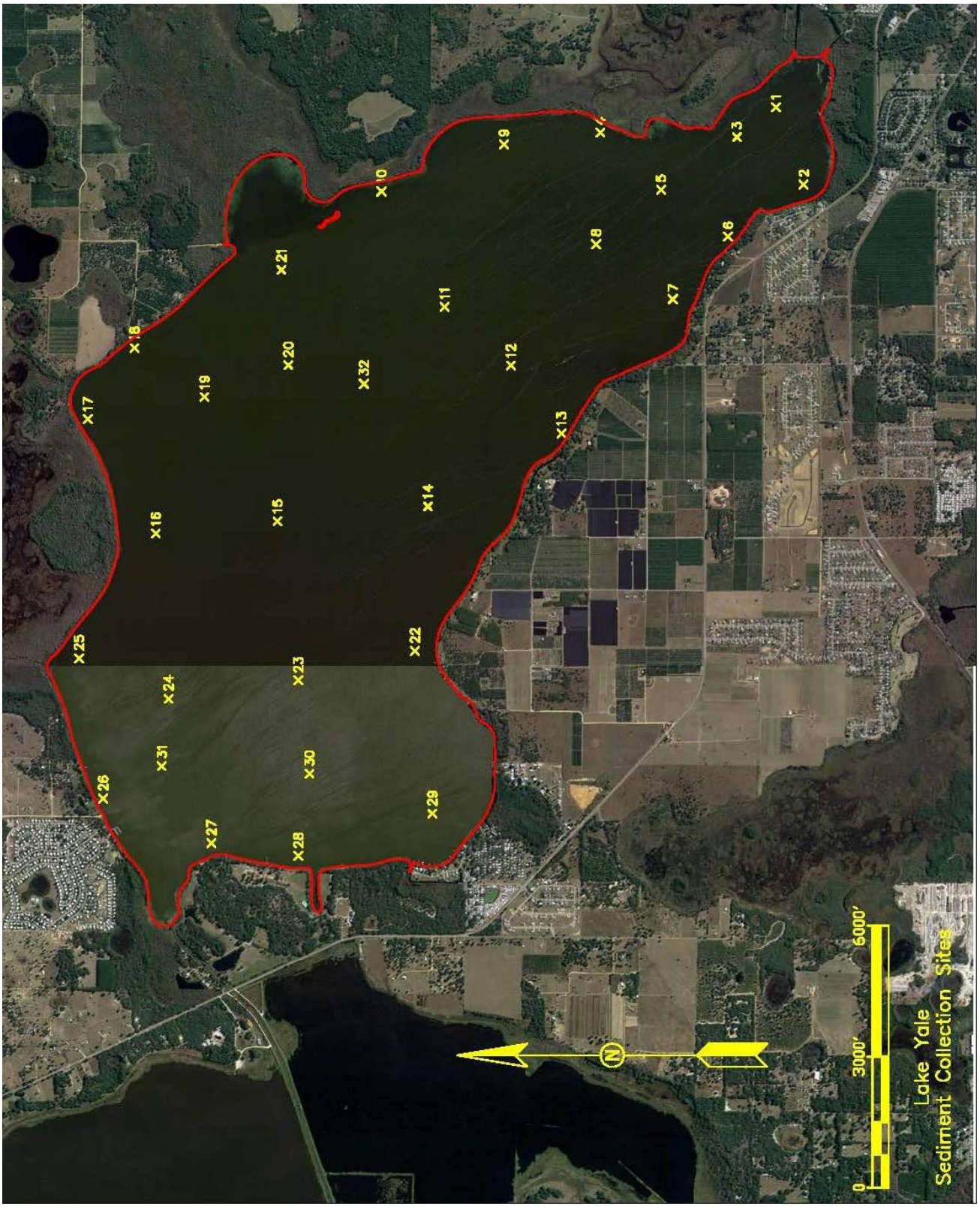


Figure 2-8. Sediment Core Collection Sites in Lake Yale.

Sediment samples were collected at each of the monitoring sites using a stainless steel split-spoon core device which was penetrated into the sediments at each location to a minimum distance of approximately 0.5-1.0 m. After retrieval of the sediment sample, any overlying water was carefully decanted before the split-spoon device was opened to expose the collected sample. Visual characteristics of each sediment core sample were recorded, and the 0-10 cm layer was carefully sectioned off and placed into a polyethylene container for transport to the ERD laboratory. Duplicate core samples were collected at each site, and the 0-10 cm layers were combined together to form a single composite sample for each of the monitoring sites. The polyethylene containers utilized for storage of the collected samples were filled completely to minimize air space in the storage container above the composite sediment sample. Each of the collected samples was stored in ice and returned to the ERD laboratory for physical and chemical characterization.

2.2.2 Sediment Characterization and Speciation Techniques

Each of the collected sediment core samples was analyzed for a variety of general parameters, including moisture content, organic content, sediment density, total nitrogen, and total phosphorus. Methodologies utilized for preparation and analysis of the sediment samples for these parameters are outlined in Table 2-7.

TABLE 2-7

ANALYTICAL METHODS FOR SEDIMENT ANALYSES

MEASUREMENT PARAMETER	SAMPLE PREPARATION	ANALYSIS REFERENCE	REFERENCE FOR PREPARATION / ANALYSIS*	METHOD DETECTION LIMITS (MDLs)
pH	EPA 9045	EPA 9045	3 / 3	0.01 pH units
Moisture Content	p. 3-54	p. 3-58	1 / 1	0.1%
Organic Content (Volatile Solids)	p. 3-52	pp. 3-52 to 3-53	1 / 1	0.1%
Total Phosphorus	pp. 3-227 to 3-228 (Method C)	EPA 365.4	1 / 2	0.005 mg/kg
Total Nitrogen	p. 3-201	pp. 3-201 to 3-204	1 / 1	0.010 mg/kg
Specific Gravity Density)	p. 3-61	pp. 3-61 to 3-62	1 / 1	NA

*REFERENCES:

1. Procedures for Handling and Chemical Analysis of Sediments and Water Samples, EPA/Corps of Engineers, EPA/CE-81-1, 1981.

2. Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised March 1983.

3. Test Methods for Evaluating Solid Wastes, Physical-Chemical Methods, Third Edition, EPA-SW-846, Updated November 1990.

In addition to general sediment characterization, a fractionation procedure for inorganic soil phosphorus was conducted on each of the collected sediment samples. A modified version of the Chang and Jackson Procedure, as proposed by Peterson and Corey (1966), was used for phosphorus fractionation. The Chang and Jackson Procedure allows the speciation of sediment phosphorus into saloid-bound phosphorus (defined as the sum of soluble plus easily exchangeable sediment phosphorus), iron-bound phosphorus, and aluminum-bound phosphorus. Although not used in this project, subsequent extractions of the Chang and Jackson procedure also provide calcium-bound and residual fractions.

The Chang and Jackson procedure was originally developed at the University of Wisconsin to evaluate phosphorus bonding in dried agricultural soils. However, drying of wet sediments will significantly impact phosphorus speciation, particularly the soluble and iron-bound associations. Therefore, the basic Chang and Jackson method was adapted and modified by ERD for wet sediments by adjusting solution concentrations and extraction timing to account for the liquid volume in the wet sediments and the reduced solids mass. This modified method has been used as the basis for all sediment inactivation projects which have been conducted in the State of Florida.

Saloid-bound phosphorus is considered to be available under all conditions at all times. Iron-bound phosphorus is relatively stable under aerobic environments, generally characterized by redox potentials greater than 200 mv (E_h), while unstable under anoxic conditions, characterized by redox potential less than 200 mv. Aluminum-bound phosphorus is considered to be stable under all conditions of redox potential and natural pH conditions. A schematic of the Chang and Jackson Speciation Procedure for evaluating soil phosphorus bounding is given in Figure 2-9.

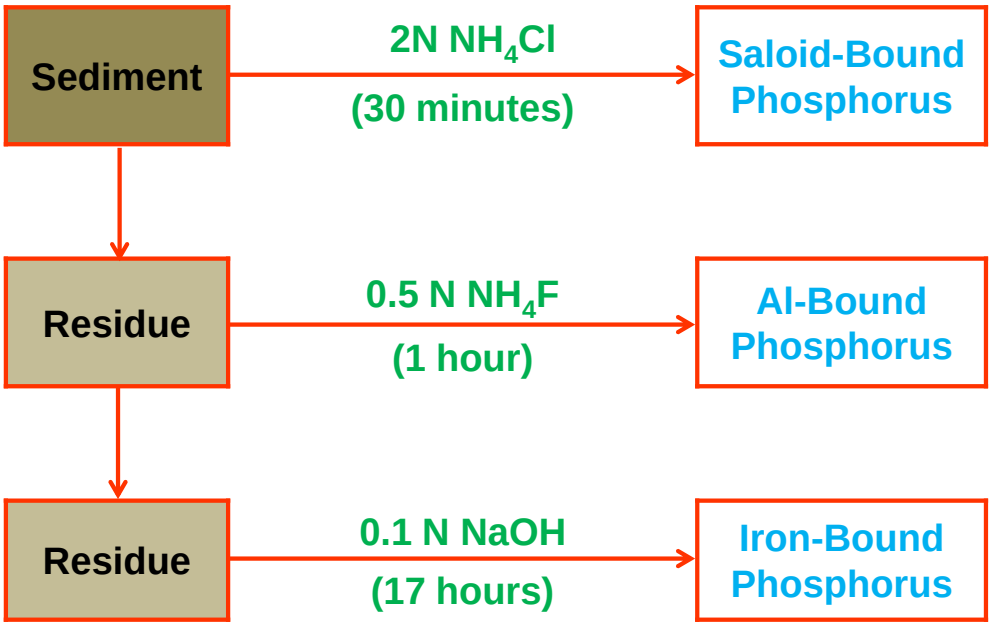


Figure 2-9. Schematic of Chang and Jackson Speciation Procedure for Evaluating Soil Phosphorus Bonding.

For purposes of evaluating release potential, ERD typically assumes that potentially available inorganic phosphorus in soils/sediments, particularly those which exhibit a significant potential to develop reduced conditions below the sediment-water interface, is represented by the sum of the soluble inorganic phosphorus and easily exchangeable phosphorus fractions (collectively termed saloid-bound phosphorus), plus iron-bound phosphorus which can become solubilized under reduced conditions. Aluminum-bound phosphorus is generally considered to be unavailable in the pH range of approximately 5.5-7.5 under a wide range of redox conditions.

2.2.3 Sediment Characteristics

Visual characteristics were recorded in the field for each of the sediment core samples collected in Trout Lake and Lake Yale, and a discussion of visual sediment characteristics is given in the following sections.

2.2.3.1 Visual Characteristics

2.2.3.1.1 Trout Lake

Visual characteristics of sediment core samples were recorded in the field for each of the 15 sediment samples collected in Trout Lake during March 2015. A summary of visual characteristics of sediment core samples from Lake Trout is given in Table 2-8. In general, a surficial layer of unconsolidated organic muck was observed in Trout Lake at 12 of the 15 monitoring sites, with measured depths ranging from 0-6 cm. This unconsolidated surficial layer is comprised primarily of organic material, such as dead algal cells, and detritus which has accumulated relatively recently onto the bottom of the lake. This layer is easily disturbed by wind action or boating activities. In deeper portions of the lake, the organic muck becomes more consolidated beneath the surficial layer, with a consistency similar to pudding. Measured depths of the consolidated organic muck layer ranged from 5-46 cm. These layers reflect older organic deposits which are relatively recalcitrant and resistant to further degradation. These layers typically do not resuspend into the water column except during extended vigorous wind activity on the lake. Light brown fine sand was observed beneath the organic muck layers which appears to be the parent bottom material for the lake. No visible muck layers were observed at monitoring sites located along the western and southwestern shoreline of Trout Lake. Photographs of sediment core samples collected in Trout Lake are provided in Appendix A-1.

2.2.3.1.2 Lake Yale

A summary of visual characteristics of sediment core samples collected in Lake Yale on January 29-30, 2015 is given in Table 2-9. In general, a surficial layer of unconsolidated organic muck was observed in Lake Yale at 21 of the 32 monitoring sites, with measured depths ranging from 0-13 cm. This unconsolidated surficial layer is comprised primarily of fresh organic material and detritus, and is easily disturbed by wind action or boating activities. In areas characterized by thick muck deposits, the organic muck becomes more consolidated beneath the surficial layer, with a consistency similar to pudding, and measured depths ranging from 16->80 cm. These layers reflect older organic deposits which are resistant to further degradation and do not typically resuspend into the water column except during extended vigorous wind activity on the lake. Areas with sediments consisting primarily of fine sand were observed in many of the perimeter portions of the lake, while thick organic sediment deposits were observed in central portions of the lake. Photographs of sediment core samples collected in Lake Yale are provided in Appendix A-2.

TABLE 2-8

VISUAL CHARACTERISTICS OF SEDIMENT CORE SAMPLES COLLECTED IN TROUT LAKE ON MARCH 18, 2015

SITE NO.	LAYER (cm)	VISUAL APPEARANCE
1	0 – 3	Dark brown unconsolidated organic muck
	3 - >31	Dark brown consolidated organic muck
2	0 - 1	Dark brown unconsolidated organic muck
	1 - 9	Dark brown consolidated organic muck
	9 - 14	Brown fine sand with organics
	14 - >18	Light brown fine sand
3	0 - 1	Dark brown unconsolidated organic muck
	1 - 15	Dark brown consolidated organic muck
	15 - 19	Brown fine sand with organics
	19 - >26	Light brown fine sand
4	0 - 6	Dark brown unconsolidated organic muck
	6 - 28	Dark brown consolidated organic muck
	28 - >44	Detritus
5	0 - 6	Dark brown unconsolidated organic muck
	6 - 21	Dark brown consolidated organic muck
	21 - 34	Detritus
	34 - >43	Brown fine sand with organics
6	0 - 6	Dark brown unconsolidated organic muck
	6 - >41	Detritus
7	0 - 1	Dark brown unconsolidated organic muck
	1 - 47	Dark brown consolidated organic muck
	47 - >55	Brown fine sand with organics
8	0 - 4	Dark brown unconsolidated organic muck
	4 - 42	Dark brown consolidated organic muck
	42 - >54	Brown fine sand with organics
9	0 - 4	Dark brown unconsolidated organic muck
	4 - 16	Dark brown consolidated organic muck
	16 - >66	Detritus
10	0 - 3	Dark brown unconsolidated organic muck
	3 - 29	Dark brown consolidated organic muck
	29 - 54	Detritus
	54 - >58	Light brown fine sand
11	0 - 10	Brown fine sand with organics
	10 - >29	Light brown fine sand
12	0 - 5	Dark brown unconsolidated organic muck
	5 - 31	Dark brown consolidated organic muck
	31 - 43	Detritus
	43 - >55	Brown fine sand with organics
13	0 - 13	Brown fine sand with organics
14	0 - 11	Brown fine sand with organics
	11 - >16	Light brown fine sand
15	0 - 3	Dark brown unconsolidated organic muck
	3 - 8	Dark brown consolidated organic muck
	8 - >24	Brown fine sand with organics

TABLE 2-9

VISUAL CHARACTERISTICS OF SEDIMENT CORE SAMPLES COLLECTED IN LAKE YALE ON JANUARY 29-30, 2015

SITE NO.	LAYER (cm)	VISUAL APPEARANCE
1	0 - 9 9 - >20	Brown fine sand with organics Light brown fine sand
2	0 - 1 1 - >52	Dark brown unconsolidated organic muck Dark brown consolidated organic muck
3	0 - 1 1 - 22 22 - 23 23 - 40 40 - >46	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Brown fine sand with organics Dark brown consolidated organic muck Light brown fine sand
4	0 - 9 9≤15	Reddish brown fine sand Light brown fine sand
5	0 - 6 6 - 37 37 - 44 44 - >51	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Brown fine sand with organics Light brown fine sand
6	0 - 2 2 - 31 31 - >44	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Light brown fine sand
7	0 - 9 9 - 35 35 - >47	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Brown fine sand with organics
8	0 - 2 2 - 61 61 - 62 62 - >78	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Small snails Dark brown consolidated organic muck
9	0 - 2 2 - 3 3 - >20	Brown fine sand with organics Light brown fine sand Gray clay
10	0 - >12	Gray clay
11	0 - 4 4 - 61 61 - 66 66 - >74	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Brown fine sand with organics Dark brown consolidated organic muck
12	0 - 2 2 - 71 71 - >73	Dark brown unconsolidated organic muck Dark brown consolidated organic muck Brown fine sand with organics
13	0 – 2 2 - >10	Brown fine sand with organics Light brown fine sand
14	0 – 4 4 - >62	Dark brown unconsolidated organic muck Dark brown consolidated organic muck
15	0 - 4 4 - >62	Dark brown unconsolidated organic muck Dark brown consolidated organic muck
16	0 - 4 4 - >8	Brown fine sand with organics Light brown fine sand
17	0 - 3 3 - >58	Dark brown unconsolidated organic muck Dark brown consolidated organic muck

TABLE 2-9 -- CONTINUED

VISUAL CHARACTERISTICS OF SEDIMENT CORE SAMPLES COLLECTED IN LAKE YALE ON JANUARY 29-30, 2015

SITE NO.	LAYER (cm)	VISUAL APPEARANCE
18	0 – 5	Brown fine sand with organics
	5 - >16	Light brown fine sand
19	0 - 3	Dark brown unconsolidated organic muck
	3 - 66	Dark brown consolidated organic muck
	66 - >69	Brown fine sand with organics
20	0 - 13	Dark brown unconsolidated organic muck
	13 - 59	Dark brown consolidated organic muck
	59 - >71	Brown fine sand with organics
21	0 - 1	Brown fine sand with organics
	1 - >10	Brown fine sand with organics…..Clay
22	0 - 5	Dark brown unconsolidated organic muck
	5 - 8	Brown fine sand with organics
	8 - 11	Light brown fine sand
	11 - >28	Brown fine sand with organics
23	0 - 6	Dark brown unconsolidated organic muck
	6 - >75	Dark brown consolidated organic muck
24	0 - 6	Dark brown unconsolidated organic muck
	6 - >81	Dark brown consolidated organic muck
25	0 - 8	Brown fine sand with organics
	8 - >22	Light brown fine sand
26	0 - 3	Brown fine sand with organics
	3 - 9	Light brown fine sand
	9 - 14	Brown fine sand with organics
	14 - 17	Detritus
	17 - 23	Brown fine sand with organics
	23 - >30	Light brown fine sand
27	0 - 2	Dark brown unconsolidated organic muck
	2 - 18	Dark brown consolidated organic muck
	18 - 19	Light brown fine sand
	19 - >33	Brown fine sand with organics
28	0 - >17	Light brown fine sand
29	0 - 4	Dark brown unconsolidated organic muck
	4 - >82	Dark brown consolidated organic muck
30	0 - 6	Dark brown unconsolidated organic muck
	6 - >71	Dark brown consolidated organic muck
31	0 - 4	Dark brown unconsolidated organic muck
	4 - >72	Dark brown consolidated organic muck
32	0 - 4	Dark brown unconsolidated organic muck
	4 - >62	Dark brown consolidated organic muck

2.2.3.2 General Physical Characteristics

After return to the ERD Laboratory, the collected sediment core samples were evaluated for general sediment characteristics, including pH, moisture content, organic content, sediment density, total nitrogen, and total phosphorus. A discussion of general characteristics of sediment core samples collected in Trout Lake and Lake Yale is given in the following sections.

2.2.3.2.1 Trout Lake

A summary of general characteristics measured in each of the 15 sediment core samples collected in Trout Lake is given in Table 2-10. In general, surficial sediments in Trout Lake were found to be slightly acidic with measured values ranging from 5.89-6.67 and an overall geometric mean of 6.31. Values in this range are typical of sediment pH measurements commonly observed in highly colored eutrophic lakes.

TABLE 2-10

GENERAL CHARACTERISTICS OF THE 0-10 cm LAYER OF SEDIMENT CORE SAMPLES COLLECTED IN TROUT LAKE DURING MARCH 2015

SITE	pH (s.u.)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	WET DENSITY (g/cm^3)	TOTAL NITROGEN ($\mu g/cm^3$)	TOTAL PHOSPHORUS ($\mu g/cm^3$)
1	6.24	90.1	67.8	1.05	1,976	707
2	6.57	45.7	6.6	1.76	2,459	544
3	6.67	81.4	29.3	1.20	1,784	454
4	6.41	90.7	40.2	1.08	1,752	475
5	6.30	91.2	40.6	1.08	1,710	467
6	6.56	88.6	48.6	1.09	1,730	651
7	5.89	82.6	51.7	1.13	1,956	534
8	6.36	91.3	42.0	1.08	1,822	427
9	6.49	91.6	45.1	1.07	1,887	533
10	6.09	80.0	59.1	1.12	2,044	687
11	6.06	30.8	1.5	2.02	1,271	564
12	6.32	92.0	44.8	1.07	1,781	515
13	6.22	34.6	2.1	1.96	2,272	559
14	6.20	63.0	6.8	1.52	2,055	482
15	6.31	58.3	6.5	1.58	2,019	558
Minimum	**5.89**	**30.8**	**1.5**	**1.05**	**1,271**	**427**
Maximum	**6.67**	**92.0**	**67.8**	**2.02**	**2,459**	**707**
Mean	**6.31**	**70.1**	**20.1**	**1.28**	**1,882**	**538**

Isopleths of pH in the top 10 cm of sediments in Trout Lake are illustrated on Figure 2-10 based upon the information provided in Table 2-10. The majority of areas within Trout Lake are characterized by pH values ranging from approximately 6.1-6.4. In general, the more elevated pH values were observed in areas of accumulated organic muck, with slightly lower pH values in areas characterized primarily by sandy sediments.

Measurements of sediment moisture content and organic content in Trout Lake sediments were found to be highly variable throughout the lake, with sediment moisture contents ranging from 30.8-92% (wet weight basis), and organic content values ranging from 1.5-67.8% (dry weight basis). The overall geometric mean values of 70.1% for moisture content and 20.1% for organic content are somewhat higher than values commonly observed in eutrophic lakes with large sediment accumulations. Several of the collected sediment samples are characterized by a relatively low moisture content and low organic content, suggesting that these surficial sediments are comprised primarily of fine sand. In contrast, other sediment core samples are characterized by elevated values for both moisture content and organic content, suggesting areas of accumulated organic muck.

Isopleths of sediment moisture content (% wet weight) in Trout Lake are summarized on Figure 2-11 based upon the information provided in Table 2-10. Areas of elevated sediment moisture content are located primarily in central portions of the lake where sediment moisture contents exceed 80-90%. Slightly lower moisture contents were observed in sediment samples collected along the eastern and western portions of the lake in areas which appear to be impacted by inflows from the large wetland areas located on the east side of the lake and water movement toward the outfall canal on the southwest side of the lake. Sediment moisture contents in excess of 50% are often indicative of highly organic sediments which includes more than 90% of the surface area of Trout Lake. The areas of elevated moisture content correspond well with the areas of accumulated muck deposits in Trout Lake illustrated on Figure 2-4.

Isopleths of sediment organic content (% dry weight) in Trout Lake are summarized on Figure 2-12 based upon the information provided in Table 2-10. In general, sediment organic content values in excess of 20-30% (dry weight basis) are often indicative of organic muck type sediments, with values less than 20-30% representing either sand or mixtures of muck and sand. Based upon these criteria, areas of concentrated organic muck are apparent throughout virtually all of the central portions of Trout Lake. These areas of high organic content also correspond closely with the areas of accumulated muck deposits illustrated on Figure 2-4. The mean sediment organic content of 20.1% in Trout Lake is somewhat higher than sediment organic contents commonly observed by ERD in eutrophic lakes in the Central Florida area.

Measured sediment density values are often useful in evaluating the general characteristics of sediments within a lake. Sediments with calculated wet densities between 1.0-1.25 g/cm^3 are typically indicative of highly organic muck type sediments, while sediment densities of approximately 2.0 g/cm^3 or greater are indicative of sandy sediment conditions, and density values between 1.25-2.0 g/cm^3 indicate mixtures of sand and muck. Measured sediment density values in Trout Lake range from 1.05-2.02 g/cm^3, with an overall geometric mean value of 1.28 g/cm^3, suggesting more organic type sediments within the lake.

Isopleths of sediment density (g/cm^3 wet) in Trout Lake sediments are given on Figure 2-13. Areas of low density sediments are apparent throughout all of the central portions of the lake. Sediments characterized by somewhat higher density values are apparent along the eastern and western shorelines of the lake where sediment accumulations may be impacted by water inflows and outflows from the lake.

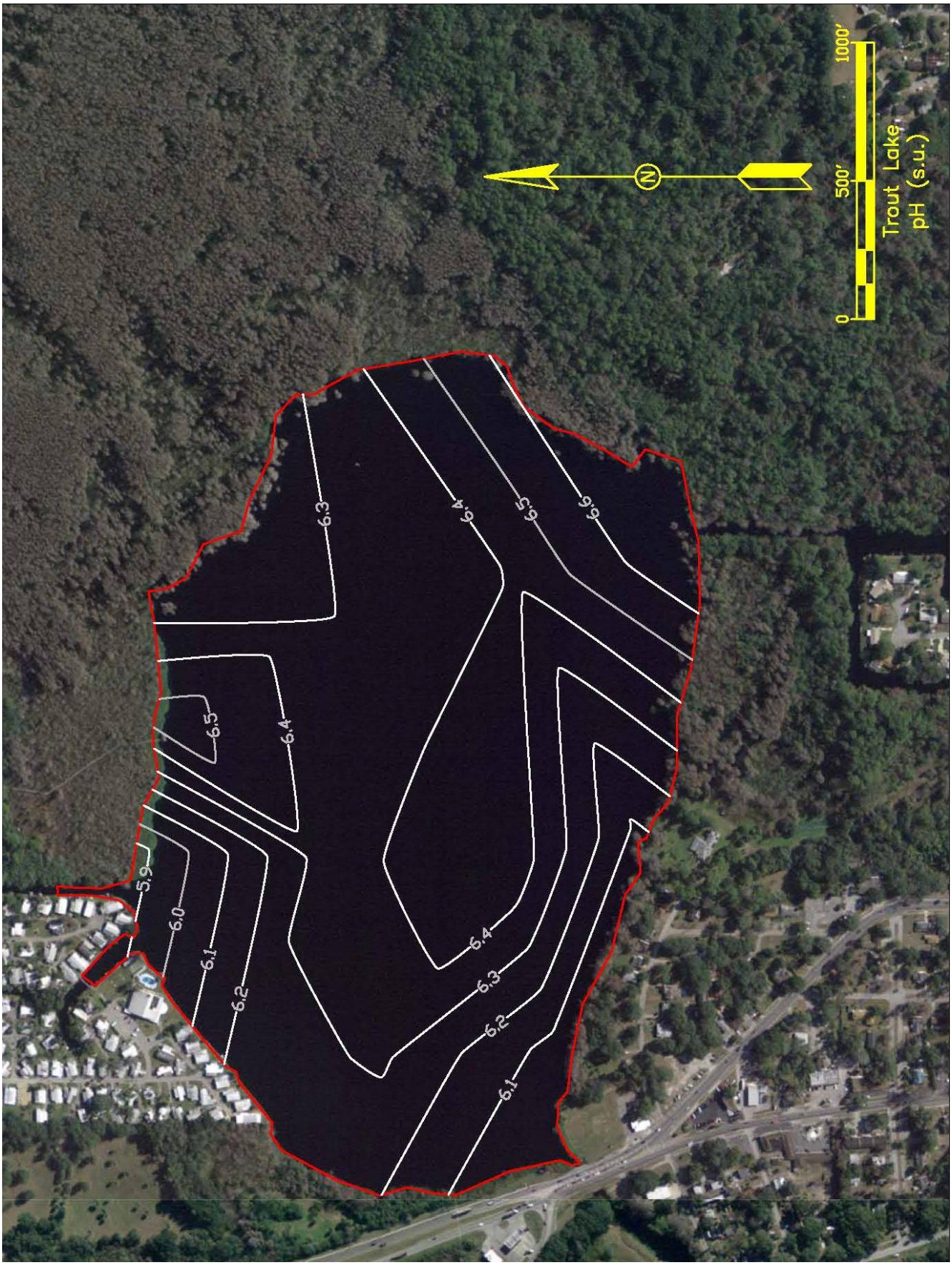


Figure 2-10. Isopleths of pH in the Top 10 cm of Sediments in Trout Lake.

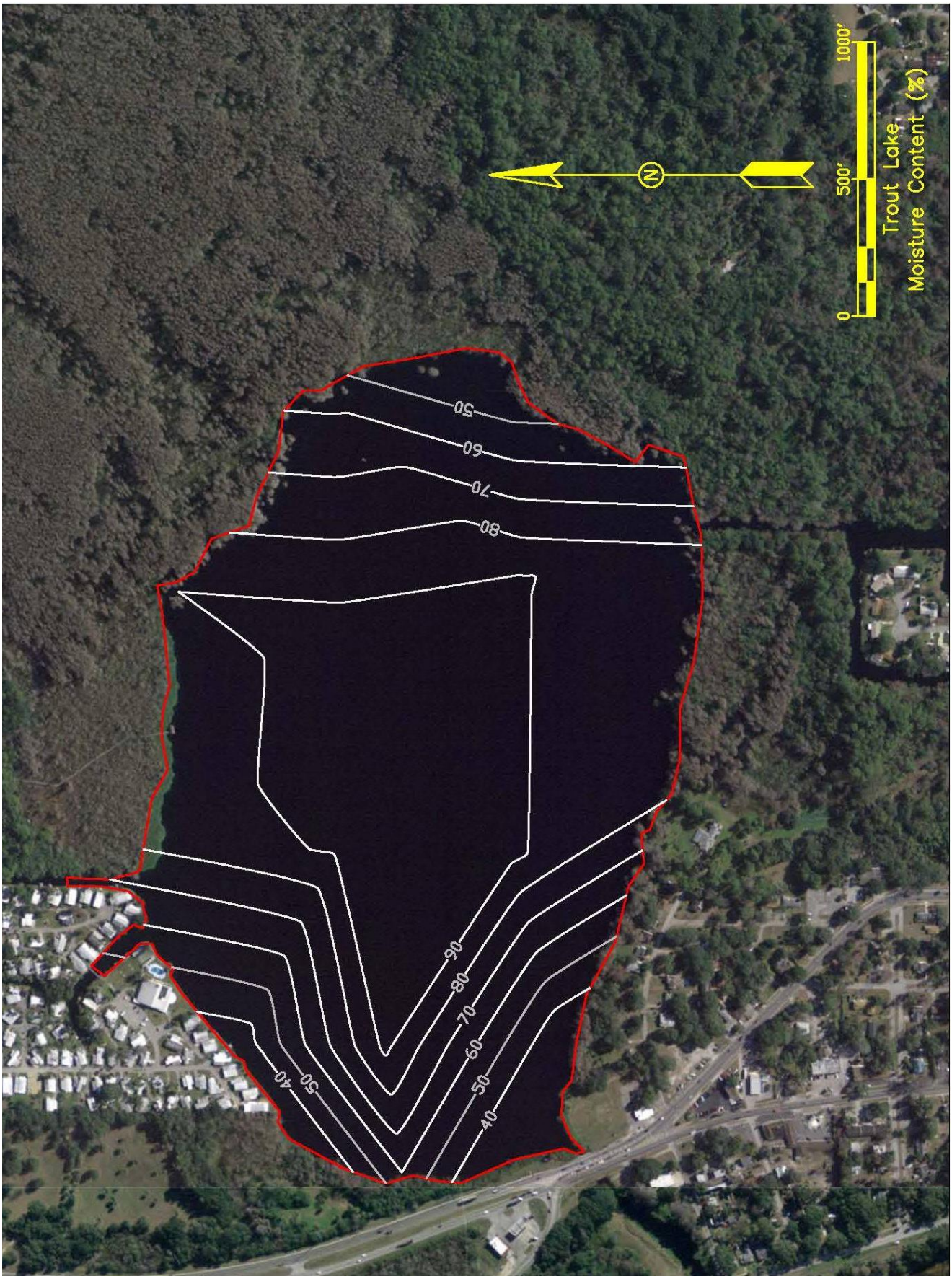


Figure 2-11. Isopleths of Moisture Content (% wet weight) in the Top 10 cm of Sediments in Trout Lake.

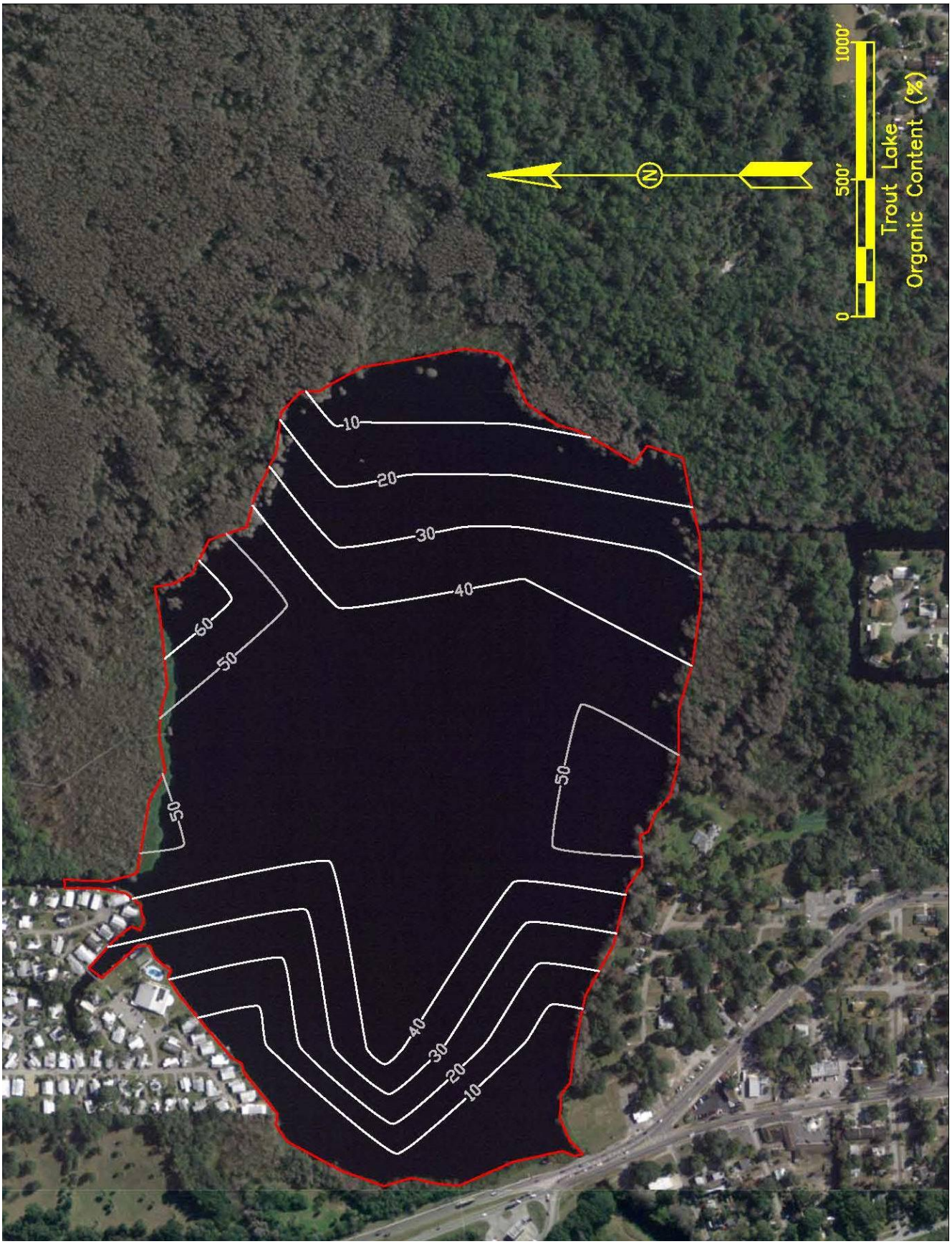


Figure 2-12. Isopleths of Organic Content (% dry weight) in the Top 10 cm of Sediments in Trout Lake.

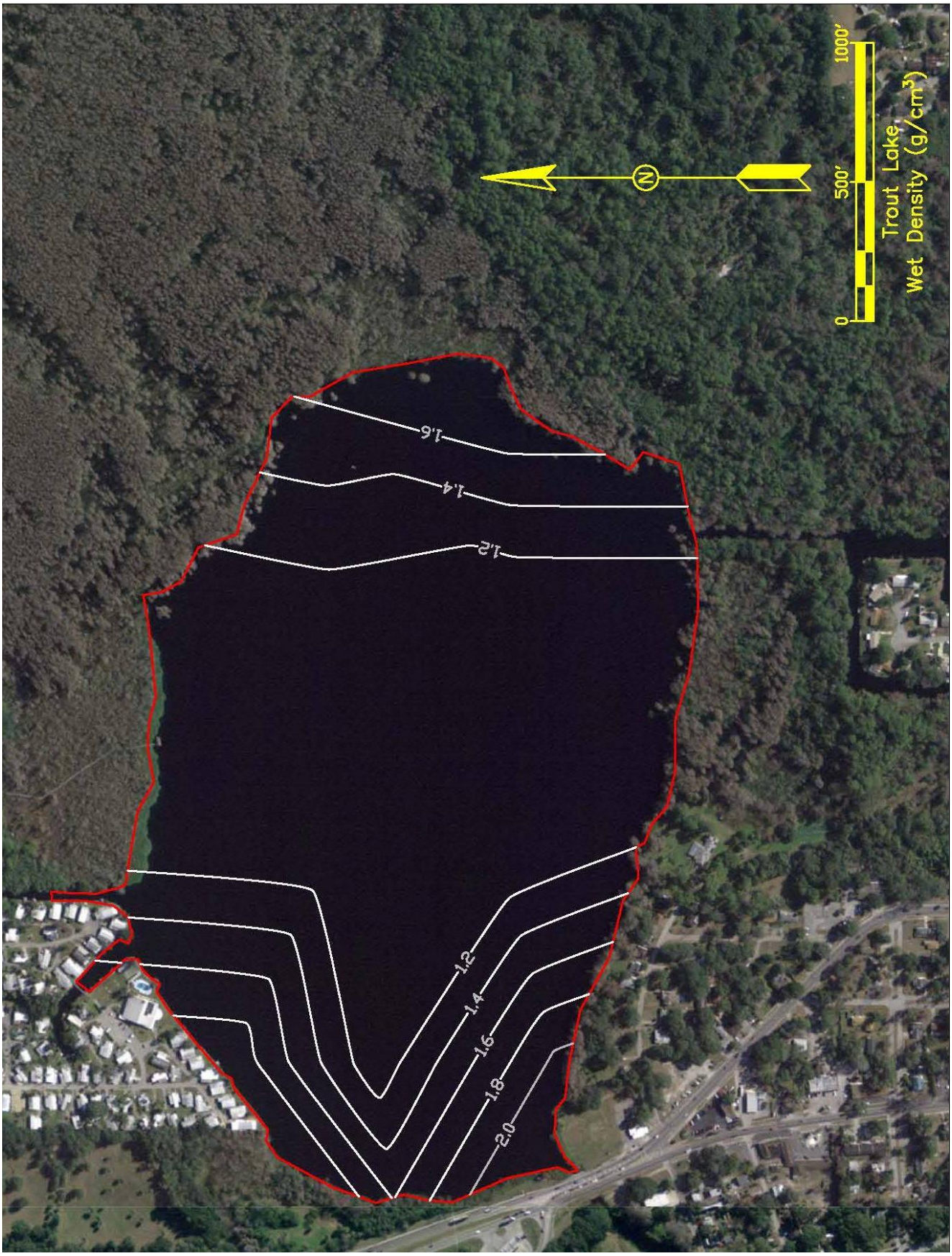


Figure 2-13. Isopleths of Wet Density (g/cm^3) in the Top 10 cm of Sediments in Trout Lake.

Measured concentrations of total nitrogen in Trout Lake sediments were found to be relatively consistent throughout the lake, ranging from 1,271-2,459 $\mu g/cm^3$ and an overall geometric mean of 1,882 $\mu g/cm^3$. Sediment nitrogen concentrations in Trout Lake appear to be similar to sediment nitrogen concentrations commonly observed by ERD in eutrophic Central Florida lakes.

Isopleths of sediment nitrogen concentrations in Trout Lake are illustrated on Figure 2-14. In contrast to the trends observed for organic content and moisture content, the lowest sediment nitrogen concentrations were observed in central portions of Trout Lake, with more elevated values observed along flow path areas on the east and west sides of the lake. The observed lower values for sediment nitrogen in central portions of Trout Lake, characterized by large accumulations of organic muck, may be related to nitrogen loss from denitrification processes which likely occur within these deep organic sediments.

Measured concentrations of total phosphorus in Trout Lake sediments were also relatively similar throughout the lake, ranging from 427-707 $\mu g/cm^3$ (wet weight), and an overall geometric mean of 538 $\mu g/cm^3$. In general, sandy sediments are often characterized by low total phosphorus concentrations, while highly organic muck type sediments are characterized by elevated total phosphorus concentrations.

Isopleths of sediment phosphorus concentrations in Trout Lake are illustrated on Figure 2-15. The distribution of total phosphorus in Trout Lake sediments appears to be similar to the trends observed for total nitrogen, with slightly lower phosphorus concentrations observed in central portions of the lake, characterized by deep accumulations of organic muck, and higher concentrations observed along the eastern and western shoreline areas. It appears that the anoxic conditions which likely occur within the muck accumulations in central portions of Trout Lake may also be releasing phosphorus into the overlying water column, resulting in a decrease in sediment phosphorus values in these areas.

2.2.3.2.2 Lake Yale

A summary of general characteristics measured in each of the 32 sediment core samples collected in Lake Yale is given in Table 2-11. In general, surficial sediments in Lake Yale were found to be approximately neutral in pH, with measured values ranging from 6.42-7.40 and an overall geometric mean of 6.87. Values in this range are typical of sediment pH measurements commonly observed in eutrophic lakes in Central Florida.

Isopleths of pH measured in the top 10 cm of sediments in Lake Yale are illustrated on Figure 2-16 based upon the information provided in Table 2-11. The majority of areas in Lake Yale appear to exhibit pH values ranging from approximately 6.5-7.3. In general, areas of lowest pH values occur in areas with the largest accumulations of organic muck, as illustrated on Figure 2-6, with the more elevated pH values observed in shoreline areas with little or no organic muck.

Isopleths of sediment moisture content (% wet weight) in Lake Yale are summarized on Figure 2-17 based upon the information provided in Table 2-11. Areas of elevated sediment moisture content are located primarily in central portions of the lake where sediment moisture contents generally exceed 50-60%. These areas correspond well with the areas of organic muck accumulation in Lake Yale, illustrated on Figure 2-6. Somewhat lower moisture content values were observed in shoreline areas, particularly along the western, northern, and northeastern portions of the lake.

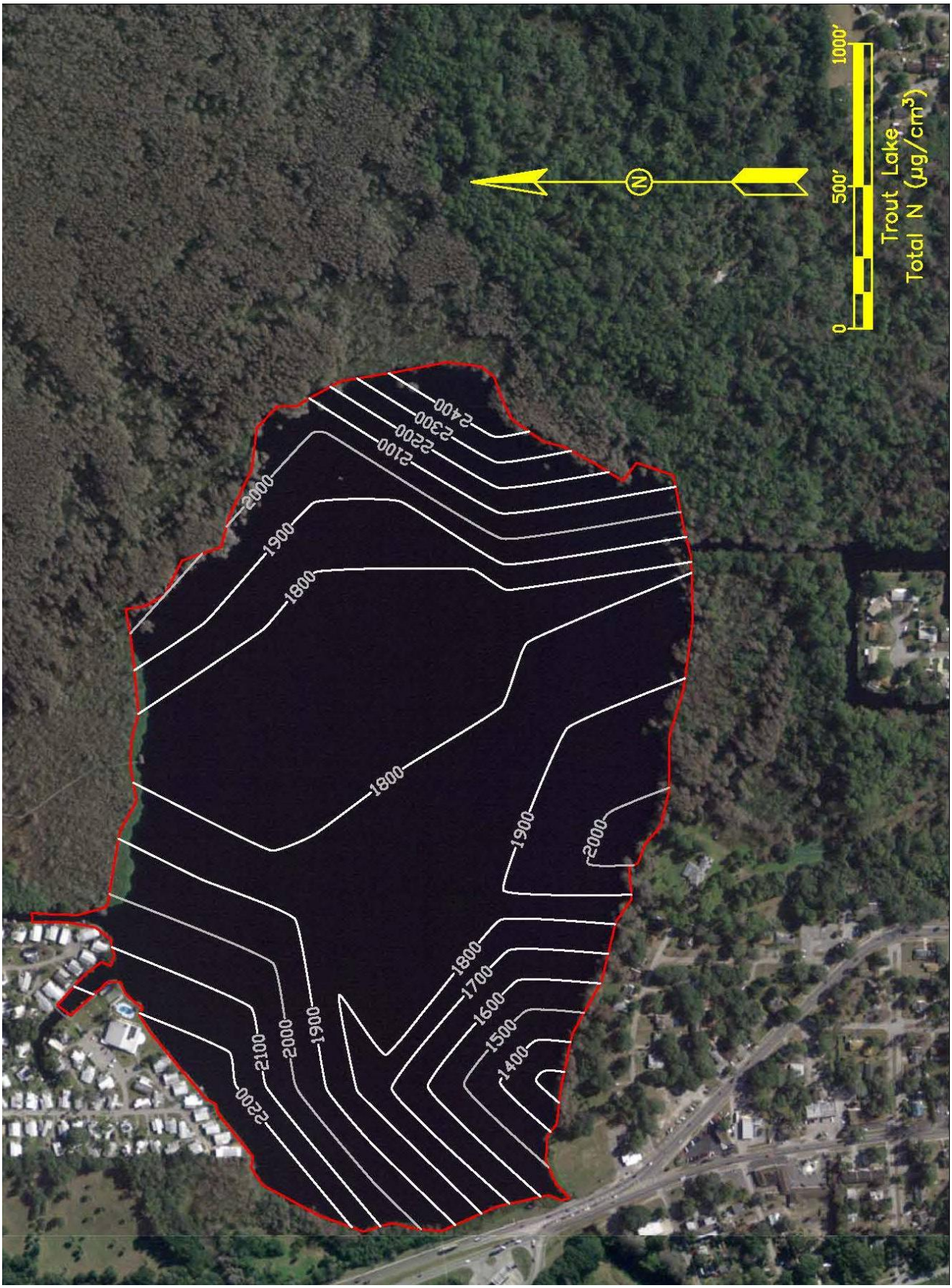


Figure 2-14. Isopleths of Total Nitrogen Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Trout Lake.

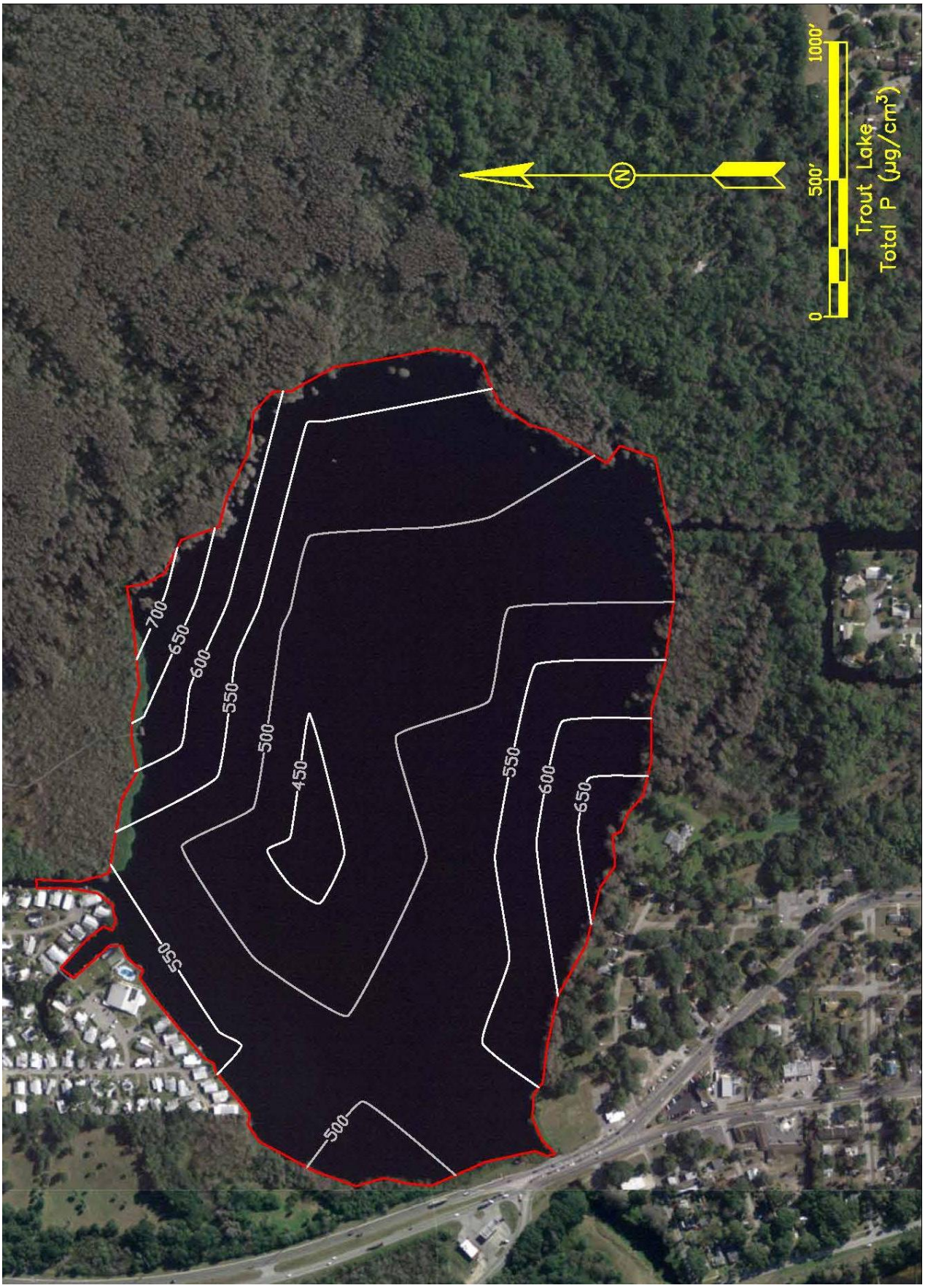


Figure 2-15. Isopleths of Total Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Trout Lake.

TABLE 2-11

GENERAL CHARACTERISTICS OF THE 0-10 cm LAYER OF SEDIMENT CORE SAMPLES COLLECTED IN LAKE YALE ON JANUARY 29-30, 2015

SITE	pH (s.u.)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	WET DENSITY (g/cm^3)	TOTAL NITROGEN ($\mu g/cm^3$)	TOTAL PHOSPHORUS ($\mu g/cm^3$)
1	6.45	32.9	10.1	2.00	2,132	344
2	6.43	94.5	52.7	1.04	3,951	530
3	6.89	82.9	26.6	1.21	3,157	364
4	7.19	26.4	4.1	2.09	2,477	374
5	6.62	95.0	52.1	1.04	3,878	466
6	6.57	93.8	46.0	1.05	4,161	479
7	6.42	94.6	47.8	1.04	3,877	427
8	6.87	91.9	36.2	1.08	3,785	367
9	7.19	31.0	3.6	2.00	1,699	210
10	7.11	17.2	2.3	2.21	2,464	399
11	6.89	92.4	40.7	1.07	3,654	427
12	6.69	95.0	54.3	1.03	4,008	569
13	7.39	24.1	5.5	2.13	1,368	436
14	6.53	96.0	62.8	1.02	4,194	628
15	7.14	90.4	32.8	1.10	3,799	384
16	6.91	20.6	0.7	2.18	859	181
17	7.13	60.7	12.5	1.36	2,508	271
18	7.40	21.5	0.4	2.17	1,015	201
19	6.72	94.2	48.0	1.05	3,966	439
20	6.61	94.5	51.7	1.04	3,835	522
21	7.29	22.9	6.4	2.13	1,286	369
22	7.20	32.0	12.2	2.01	2,068	333
23	6.87	95.7	62.9	1.02	3,972	563
24	6.69	94.6	52.1	1.04	3,938	428
25	7.06	23.1	0.8	2.14	822	183
26	7.16	24.7	0.9	2.12	1,943	254
27	6.56	76.4	21.4	1.31	3,120	394
28	7.27	22.4	0.6	2.16	996	170
29	6.70	92.7	36.9	1.07	3,903	428
30	6.68	95.2	57.9	1.03	3,707	536
31	6.79	93.5	47.9	1.05	3,756	517
32	6.75	93.7	43.2	1.05	3,980	442
Minimum	**6.42**	**17.2**	**0.4**	**1.02**	**822**	**170**
Maximum	**7.40**	**96.0**	**62.9**	**2.21**	**4,194**	**628**
Mean	**6.87**	**55.4**	**14.0**	**1.39**	**2,640**	**373**

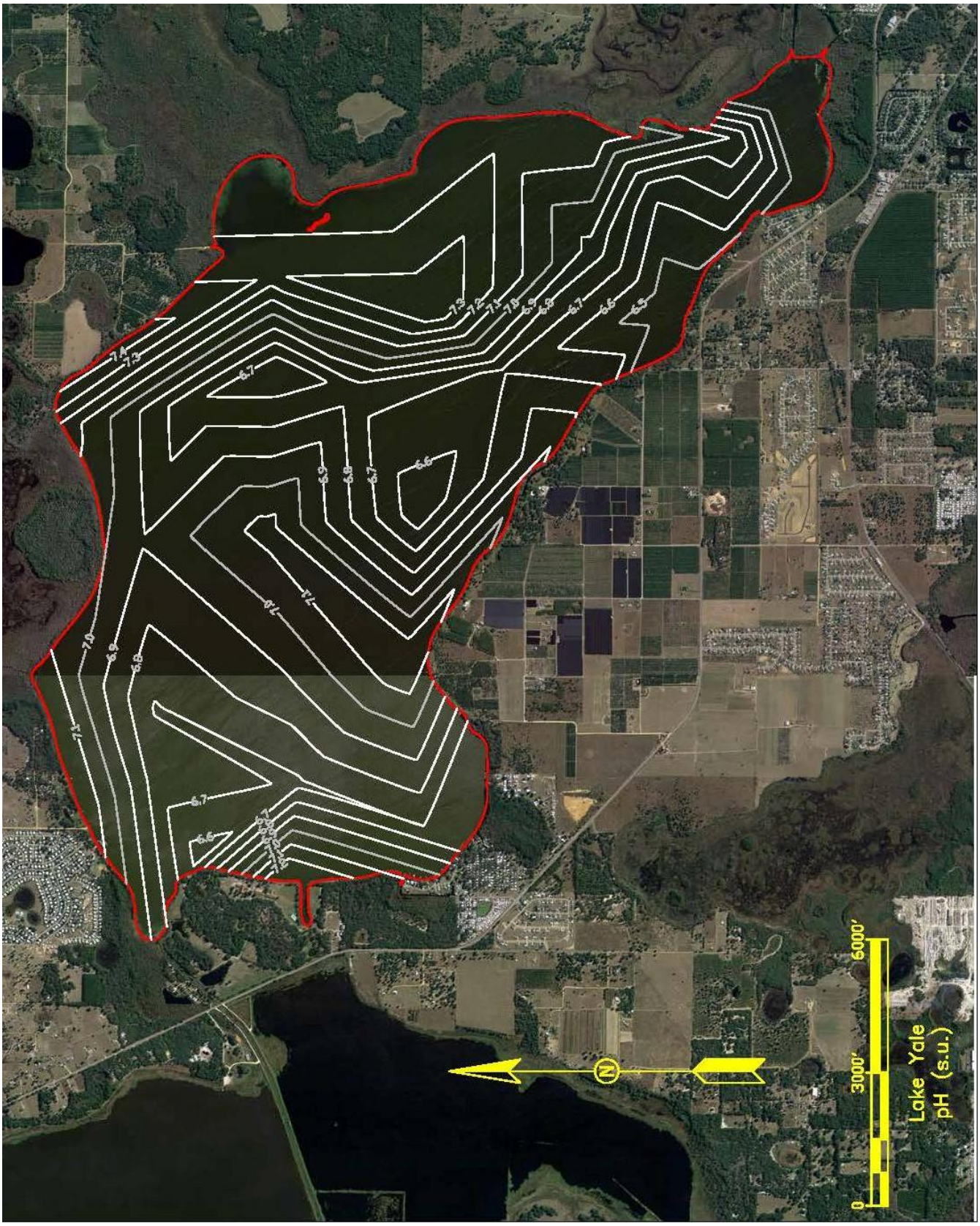


Figure 2-16. Isopleths of pH in the Top 10 cm of Sediments in Lake Yale.

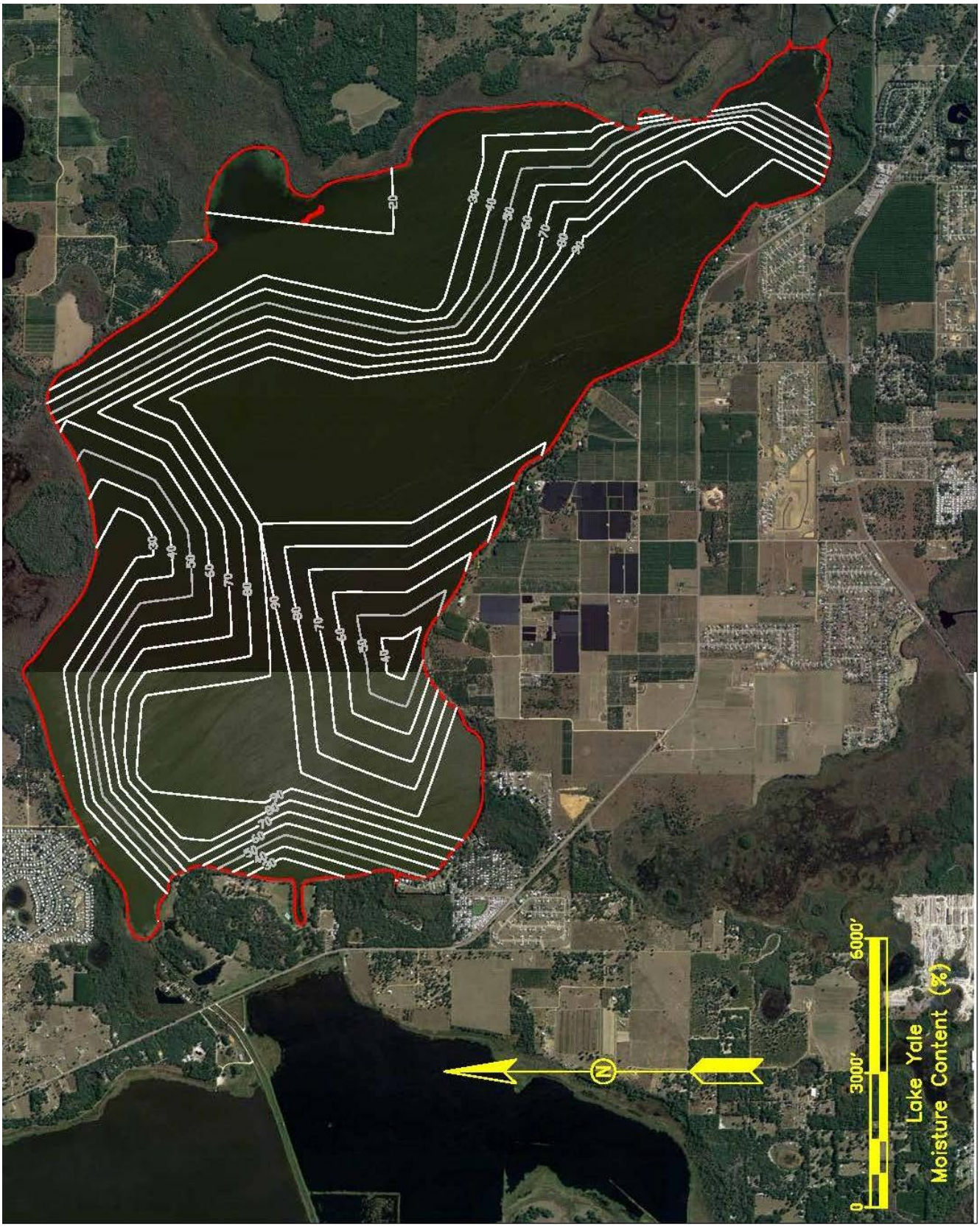


Figure 2-17. Isopleths of Moisture Content (% wet weight) in the Top 10 cm of Sediments in Lake Yale.

Isopleths of sediment organic content (% dry weight) in Lake Yale are summarized on Figure 2-18 based upon the information provided in Table 2-11. Areas of elevated organic content, exceeding 40%, were observed in central portions of the lake in areas of accumulated organic muck. The mean sediment organic content of 14.0% measured in Lake Yale is on the higher end of sediment organic content values commonly observed by ERD in eutrophic lakes in the Central Florida area.

Measured sediment density values in Lake Yale ranged from 1.02-2.21 g/cm^3, indicating a wide range of both organic and sandy sediments. The overall mean geometric density value of 1.39 g/cm^3 is similar to the overall geometric mean value of 1.28 g/cm^3 measured in Trout Lake.

Isopleths of sediment density (g/cm^3 wet) in Lake Yale sediments are given on Figure 2-19. Density values in central portions of the lake range from approximately 1.2-1.4 g/cm^3, indicating primarily highly organic muck type sediments. Somewhat higher density values were observed in shoreline areas, particularly along the west, north, and northeast sides of the lake, where density values suggest primarily sandy type sediments in these areas.

Measured concentrations of total nitrogen in Lake Yale sediments exhibited a relatively high degree of variability in measured values throughout the lake in contrast to the relatively consistent values observed in Trout Lake. Sediment total nitrogen concentrations in Lake Yale ranged from 822-4,194 $\mu g/cm^3$, with an overall geometric mean of 2,640 $\mu g/cm^3$. Sediment nitrogen concentrations in Lake Yale are slightly greater than values measured in Trout Lake but are still similar to sediment nitrogen concentrations commonly observed by ERD in eutrophic Central Florida lakes.

Isopleths of sediment nitrogen concentrations ($\mu g/cm^3$) in Lake Yale are illustrated on Figure 2-20. The most elevated levels of sediment nitrogen were observed in central portions of the lake in areas which correspond to the largest accumulations of organic muck. This trend is in contrast to the reduction in nitrogen concentrations observed in Trout Lake in high muck areas. Sediment nitrogen concentrations in Lake Yale decrease in shoreline areas, with the majority of shoreline areas exhibiting concentrations ranging from 1,000-2,000 $\mu g/cm^3$, particularly on the west, north, and northeast shorelines of the lake.

Measured concentrations of total phosphorus in Lake Yale sediments exhibited only a moderate degree of variability throughout the lake, with measured concentrations ranging from 170-628 $\mu g/cm^3$ (wet weight), and an overall geometric mean of 373 $\mu g/cm^3$, which is approximately 40% lower than the overall geometric mean of 538 $\mu g/cm^3$ for total phosphorus measured in Trout Lake. However, the measured geometric mean value for Lake Yale at 279 $\mu g/cm^3$ still reflects a moderately elevated value for phosphorus compared with other eutrophic Central Florida lakes.

Isopleths of sediment phosphorus concentrations ($\mu g/cm^3$ wet weight) in Lake Yale are illustrated on Figure 2-21. The most elevated levels of sediment phosphorus appear to occur primarily in central portions of the lake in areas with elevated muck accumulations. Sediment phosphorus concentrations appear to decrease in shoreline areas with low muck accumulations, particularly along the west, northern, and northeastern shorelines of the lake.

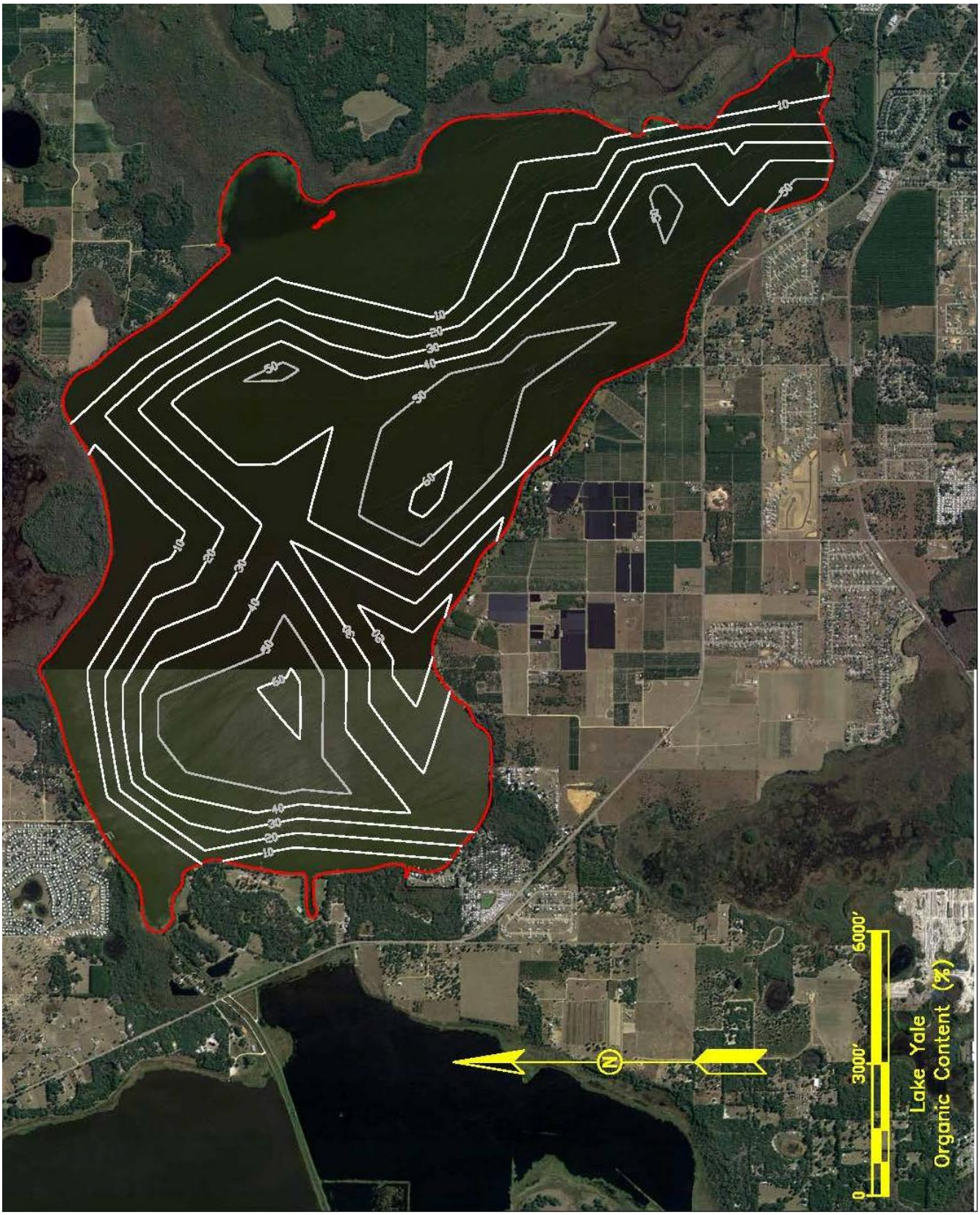


Figure 2-18. Isopleths of Organic Content (% dry weight) in the Top 10 cm of Sediments in Lake Yale.

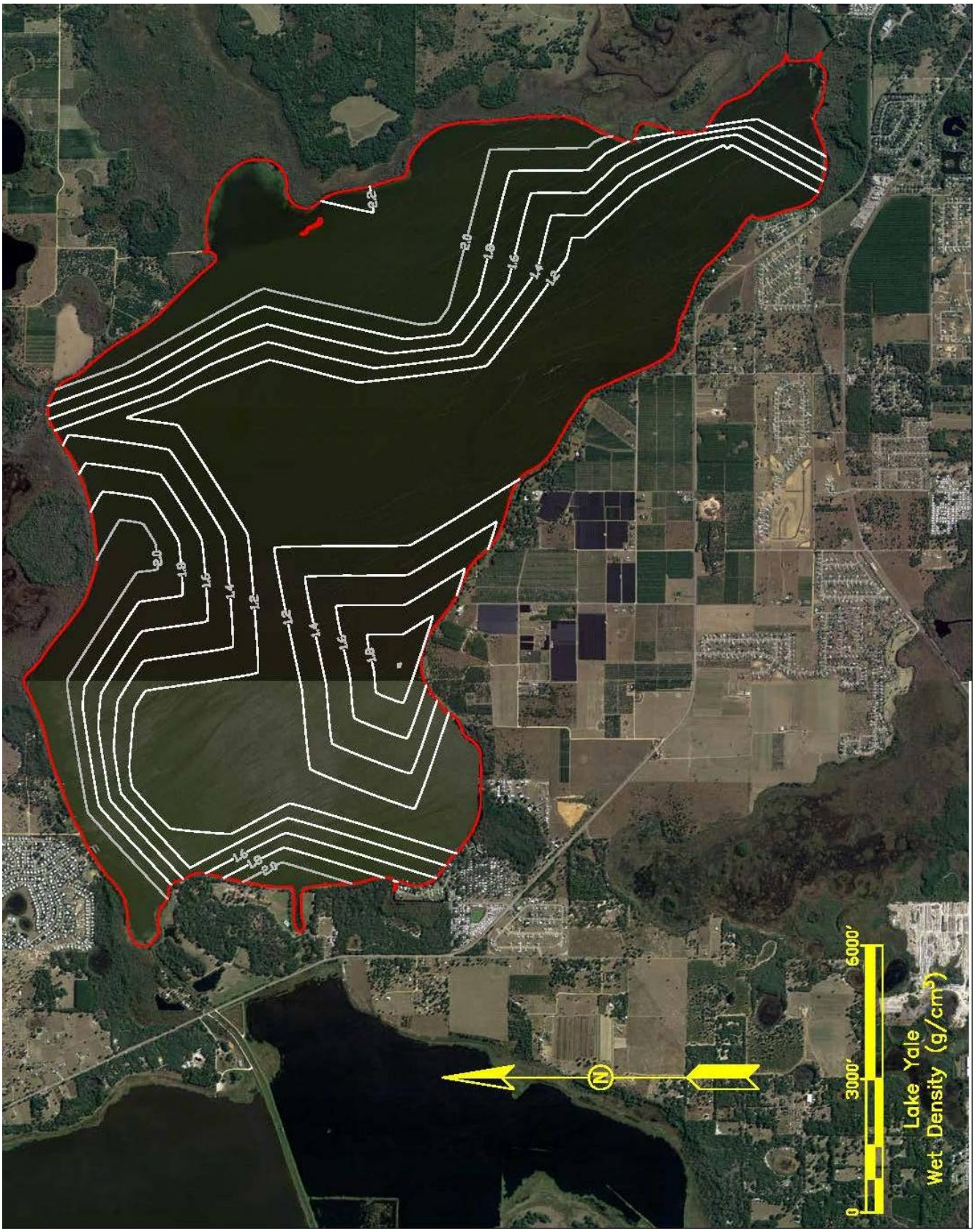


Figure 2-19. Isopleths of Wet Density (g/cm^3) in the Top 10 cm of Sediments in Lake Yale.

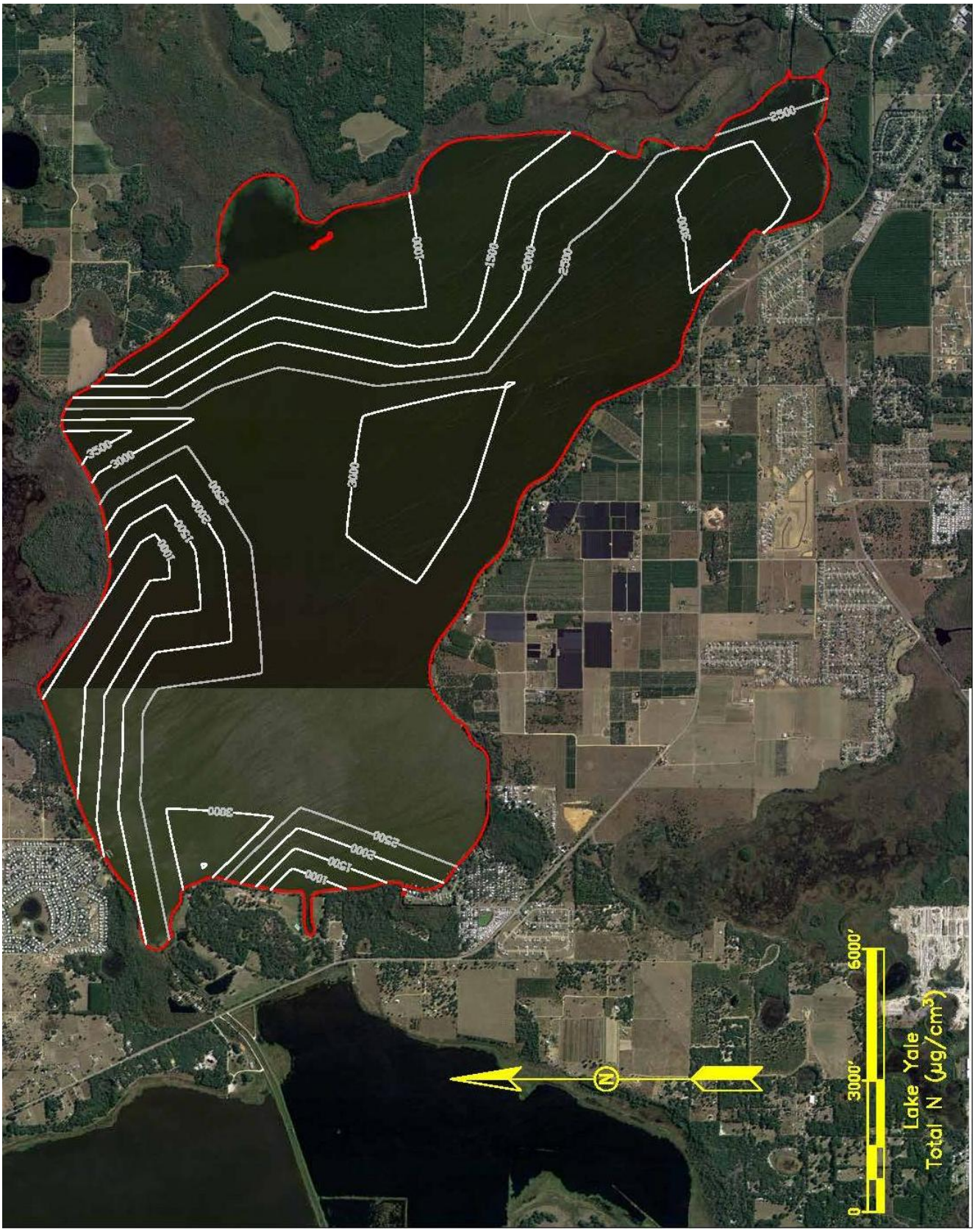


Figure 2-20. Isopleths of Total Nitrogen Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Lake Yale.

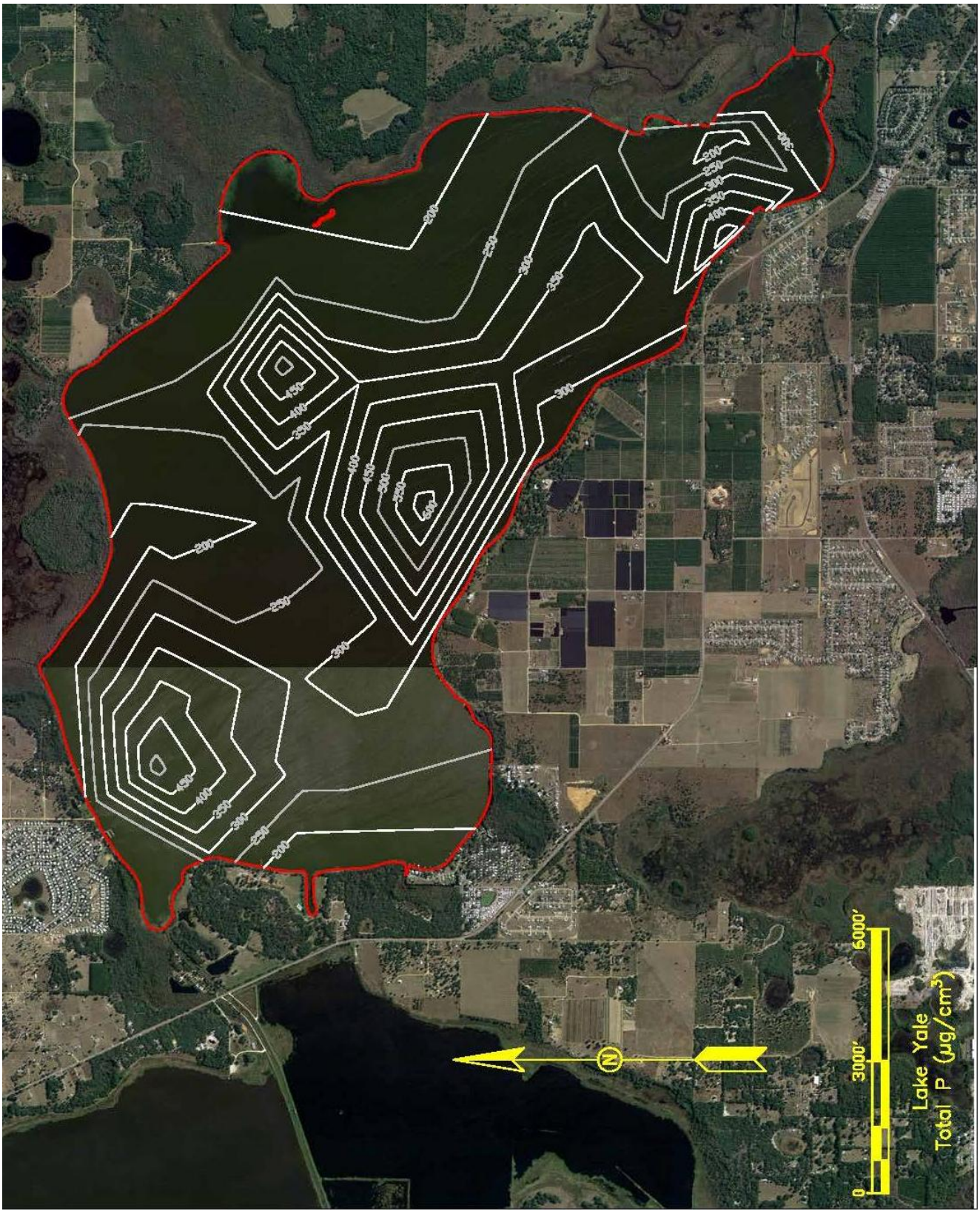


Figure 2-21. Isopleths of Total Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Lake Yale.

2.2.3.3 Sediment Phosphorus Speciation

Each of the collected sediment core samples from Trout Lake and Lake Yale were carried through a sequential extraction procedure to quantify phosphorus bonding mechanisms within the sediments. A discussion of phosphorus bonding in the sediments of Trout Lake and Lake Yale is given in the following sections.

2.2.3.3.1 Trout Lake

A summary of phosphorus speciation in the top 10 cm of sediment core samples collected in Trout Lake during March 2015 is given in Table 2-12. Saloid-bound phosphorus represents phosphorus which is either soluble or easily exchangeable and is typically considered to be readily available for release from the sediments into the overlying water column either by diffusion or moderate agitation. As seen in Table 2-12, saloid-bound phosphorus concentrations appear to be relatively uniform throughout the sediments of Trout Lake, with measured values ranging from 4.3-11 $\mu g/cm^3$ (wet weight), and an overall geometric mean of 6.2 $\mu g/cm^3$. The measured saloid-bound phosphorus concentrations in Trout Lake sediments are somewhat greater than concentrations commonly observed by ERD in other eutrophic urban lakes.

TABLE 2-12

PHOSPHORUS SPECIATION IN THE TOP 10 cm OF SEDIMENT CORE SAMPLES COLLECTED IN TROUT LAKE DURING MARCH 2015

SITE	SEDIMENT PHOSPHORUS SPECIATION ($\mu g/cm^3$)				SEDIMENT PHOSPHORUS AVAILABLE (%)
	Saloid-Bound	Iron-Bound	Total Available	Aluminum-Bound	
1	7.9	23	31	42	4
2	7.2	195	202	46	37
3	5.7	75	81	41	18
4	4.6	92	97	83	20
5	4.5	117	121	73	26
6	6.6	66	73	70	11
7	5.0	141	146	72	27
8	4.6	158	163	62	38
9	4.6	136	141	50	26
10	4.9	214	219	70	32
11	11	49	60	19	11
12	4.3	83	87	63	17
13	11	59	70	67	12
14	7.9	119	127	57	26
15	8.5	108	117	71	21
Minimum	**4.3**	**23**	**31**	**19**	**4**
Maximum	**11**	**214**	**219**	**83**	**38**
Mean	**6.2**	**95**	**104**	**56**	**19**

Isopleths of saloid-bound phosphorus ($\mu g/cm^3$) in the top 10 cm of sediments in Trout Lake are given on Figure 2-22. The lowest concentrations of saloid-bound phosphorus were observed in central portions of Trout Lake, with values of approximately 5 $\mu g/cm^3$ or less. This trend is the opposite of the trend commonly observed for saloid-bound phosphorus where the most elevated concentrations are generally observed in areas with the largest accumulations of organic muck. Saloid-bound phosphorus concentrations in Trout Lake appear to increase in shoreline areas with the least accumulation of organic muck.

In general, iron-bound phosphorus associations in the sediments of Trout Lake were moderately elevated in value. Iron-bound phosphorus is relatively stable under oxidized conditions, but becomes unstable under a reduced environment, causing the iron-phosphorus bonds to separate and release the bound phosphorus directly into the water column. Iron-bound phosphorus concentrations in the sediments of Trout Lake ranged from 23-214 $\mu g/cm^3$ (wet weight), with an overall geometric mean of 95 $\mu g/cm^3$. Since iron-bound phosphorus can be released under anoxic conditions, large portions of Trout Lake may have conditions favorable for release of iron-bound sediment phosphorus into the water column throughout much of the year. The iron-bound phosphorus concentrations summarized in Table 2-12 appear to be somewhat elevated compared with values commonly observed in eutrophic Central Florida lakes. The mean value of 95 $\mu g/cm^3$ measured in Trout Lake is approximately 50% greater than the mean iron-bound phosphorus concentration of 64 $\mu g/cm^3$ measured by ERD in Lake Killarney, a eutrophic urban lake located in Winter Park, FL where sediment phosphorus release contributed more than 50% of the annual phosphorus loading to the lake.

Isopleths of iron-bound phosphorus in the top 10 cm of Trout Lake are illustrated on Figure 2-23. The most elevated levels of iron-bound phosphorus were observed in central and southern portions of Trout Lake in areas of deep muck accumulations. Shoreline areas with little or no organic muck generally have lower iron-bound phosphorus concentrations.

Total available phosphorus represents the sum of the saloid-bound and iron-bound phosphorus associations in each sediment core sample. Since the saloid-bound phosphorus is immediately available, and the iron-bound phosphorus is available under reduced conditions, the sum of these speciations represents the total phosphorus which is potentially available within the lake sediments. This information can be used as a guide for calculating and designing future sediment inactivation procedures. A summary of total available phosphorus in each of the 15 collected sediment core samples from Trout Lake is given in Table 2-12. Total available phosphorus concentrations within the lake ranged from 31-219 $\mu g/cm^3$, with an overall mean of 104 $\mu g/cm^3$. The mean sediment available phosphorus in Trout Lake is approximately 50% greater than the mean sediment available phosphorus measured by ERD in Lake Holden and Lake Pineloch, both of which are eutrophic urban lakes in Central Florida with significant internal loadings from sediment release.

Isopleths of total available phosphorus in the top 10 cm of sediments in Trout Lake are illustrated on Figure 2-24. The most elevated levels of available phosphorus are apparent in central and southern portions of the lake and correspond roughly to the areas of the greatest accumulations for organic muck.

Sediment available phosphorus is also expressed in Table 2-12 as a percentage of the total phosphorus concentrations within the sediments. This provides an estimate of the fraction of the current phosphorus accumulations which are available for release into the overlying water column. The percentage of sediment available phosphorus within the sediments of Trout Lake ranges from 4-38%, with an overall mean of approximately 19%. This value suggests that an average of 19% of the existing accumulation of phosphorus within Trout Lake sediments is potentially available for release into the overlying water column as a result of sediment agitation or anoxic conditions.

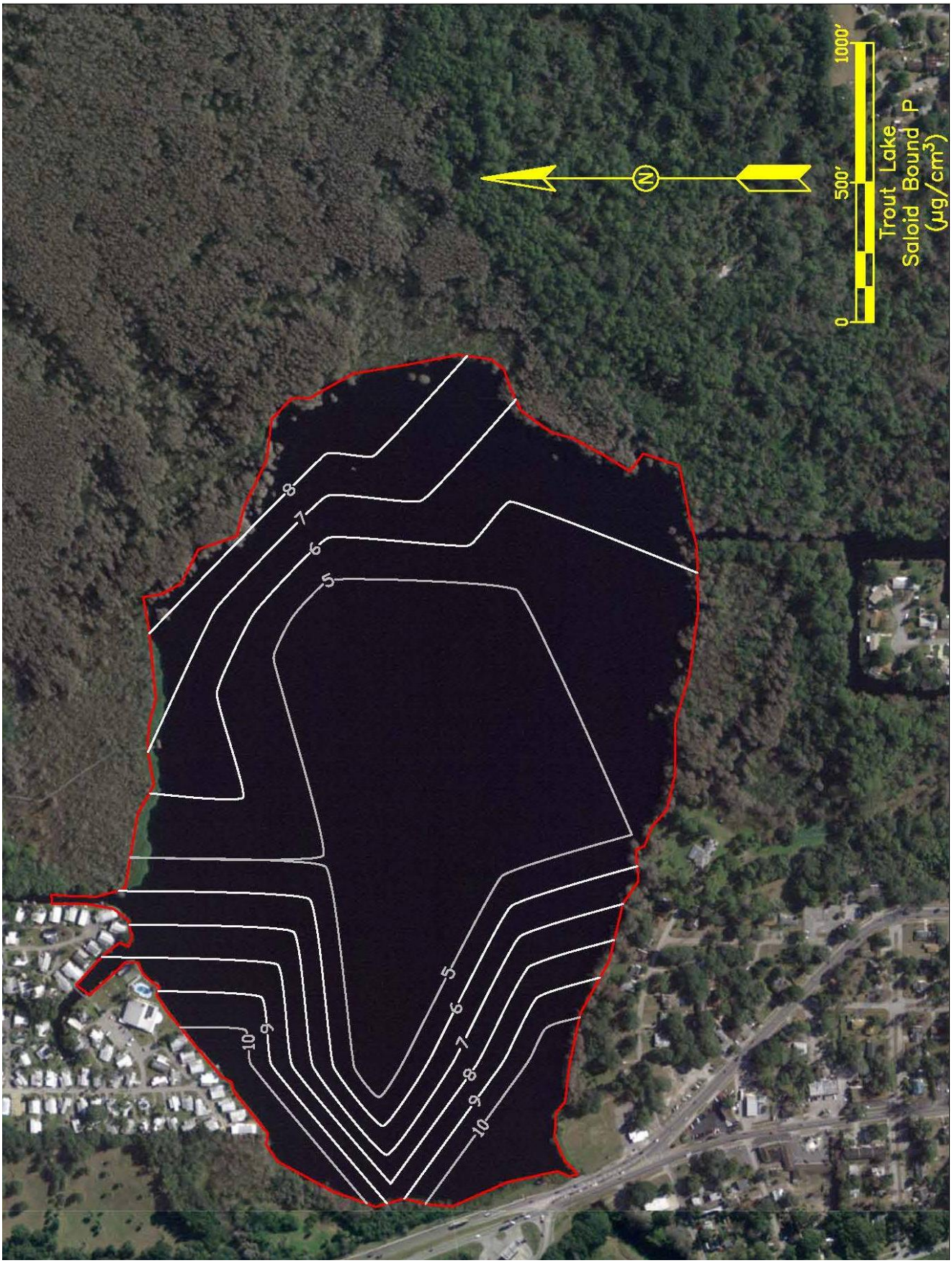


Figure 2-22. Isopleths of Saloid-Bound Phosphorus Concentrations ($\mu g/cm^3$) in the Top 10 cm of Sediments in Trout Lake.

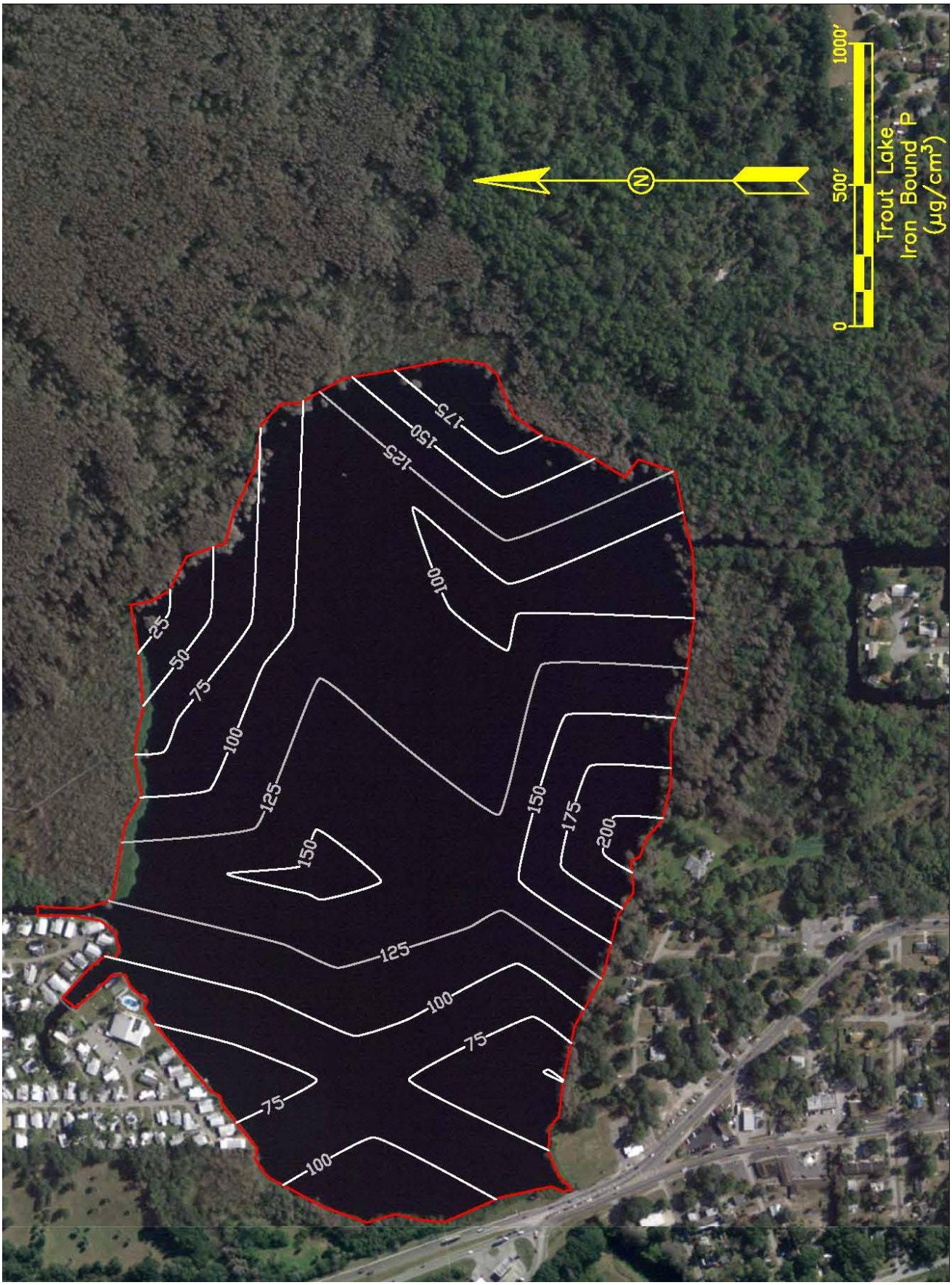


Figure 2-23. Isopleths of Iron-Bound Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Trout Lake.

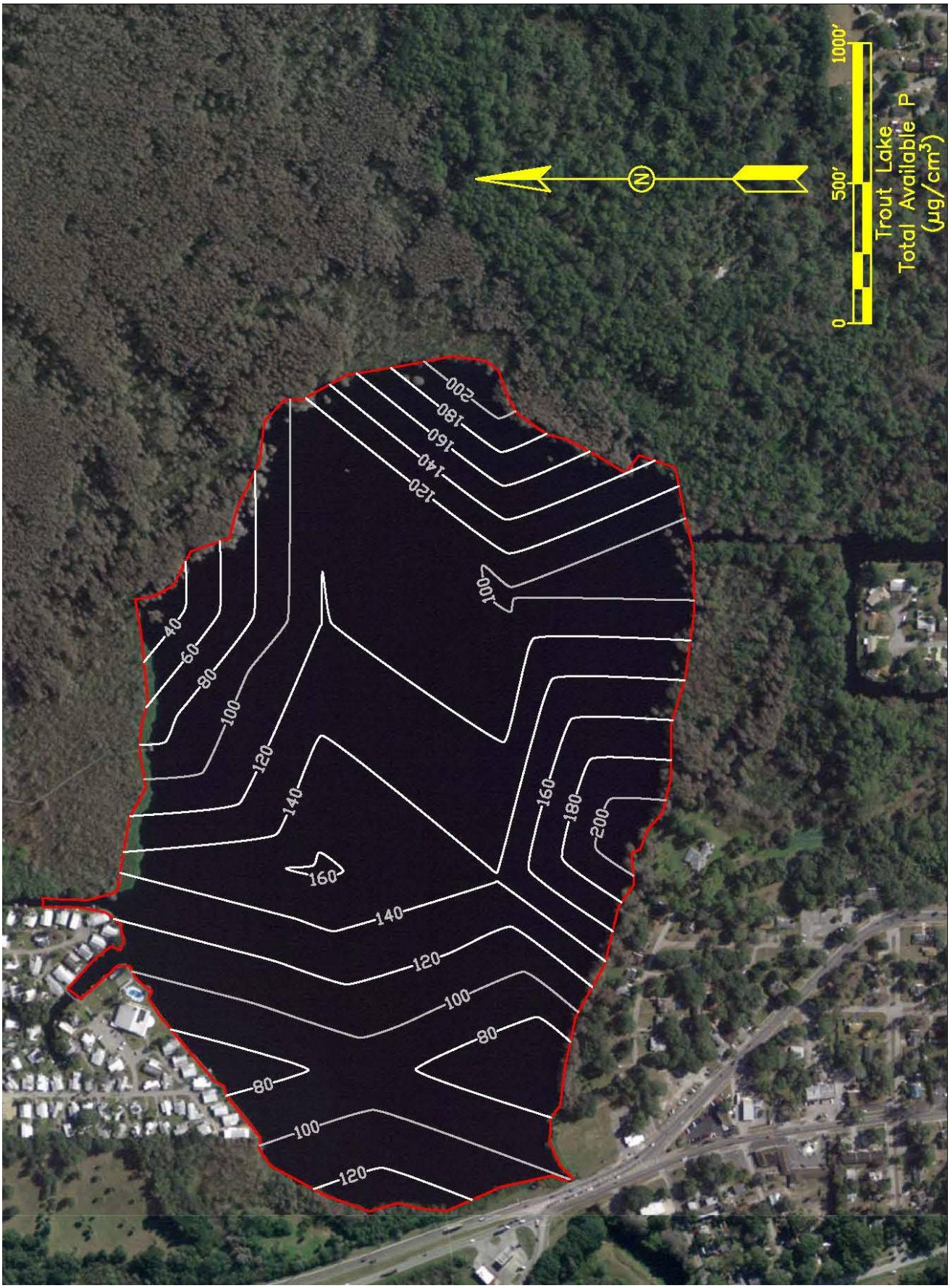


Figure 2-24. Isopleths of Total Available Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Trout Lake.

Isopleths of available sediment phosphorus as a percentage of total sediment phosphorus are given on Figure 2-25. The largest percentages of available sediment phosphorus occur in central and eastern portions of the lake where approximately 35% of the sediment total phosphorus is potentially available for release.

The sediment speciation procedure also identifies phosphorus which is bound to aluminum under existing conditions. Since aluminum-phosphorus bonds are stable under a wide range of environmental conditions, these bonding mechanisms represent an inert portion of the overall phosphorus present. Measured concentrations of aluminum-bound phosphorus in the sediments of Trout Lake ranged from 19-83 $\mu g/cm^3$, with an overall geometric mean of 56 $\mu g/cm^3$.

Isopleths of aluminum-bound phosphorus in the sediments of Trout Lake are illustrated on Figure 2-26. The highest concentrations of aluminum-bound phosphorus appear to occur in central portions of the lake, with decreasing concentrations in shoreline areas, particularly in areas adjacent to the lake outfall to Lake Eustis.

2.2.3.3.2 Lake Yale

A summary of phosphorus bonding mechanisms and speciation in each of the 32 sediment core samples collected in Lake Yale is given in Table 2-13. Saloid-bound phosphorus in the sediments of Lake Yale ranged from 0.1-15 $\mu g/cm^3$, with an overall geometric mean of 2.0 $\mu g/cm^3$. The overall geometric mean value for saloid-bound phosphorous in Lake Yale is approximately one-third of the mean saloid-bound phosphorus concentration measured in Trout Lake. Overall, the saloid-bound phosphorus concentrations observed in Lake Yale are similar to values commonly observed by ERD in eutrophic lakes in Central Florida.

Isopleths of saloid-bound phosphorus in the top 10 cm of sediments in Lake Yale are given in Figure 2-27. The most elevated levels of saloid-bound phosphorus were observed in central portions of Lake Yale, with increasingly lower concentrations observed in shoreline areas. The observed area of maximum saloid-bound phosphorus appears to be more localized than the broad area of elevated saloid-bound phosphorus observed in Trout Lake.

Isopleths of iron-bound phosphorus in the top 10 cm of sediments in Lake Yale are given in Figure 2-28. Iron-bound phosphorus is potentially available for release into the overlying water column during periods of anoxia at or below the water-sediment interface. The most elevated concentrations of iron-bound phosphorus were observed primarily in central portions of Lake Yale where concentrations ranged from approximately 50-100 $\mu g/cm^3$. A slight decrease in iron-bound phosphorus was observed in several of the shoreline areas, although not to the extent exhibited by other sediment parameters. Iron-bound phosphorus concentrations in the sediments of Lake Yale ranged from 31-117 $\mu g/cm^3$, with an overall geometric mean of 73 $\mu g/cm^3$.

Total available phosphorus represents the sum of the saloid-bound and iron-bound phosphorus associations and reflects the potentially available phosphorus which can be released from the lake sediments. Total available phosphorus concentrations in the top 10 cm of sediments in Lake Yale ranged from 42-118 $\mu g/cm^3$, with an overall geometric mean of 77 $\mu g/cm^3$.

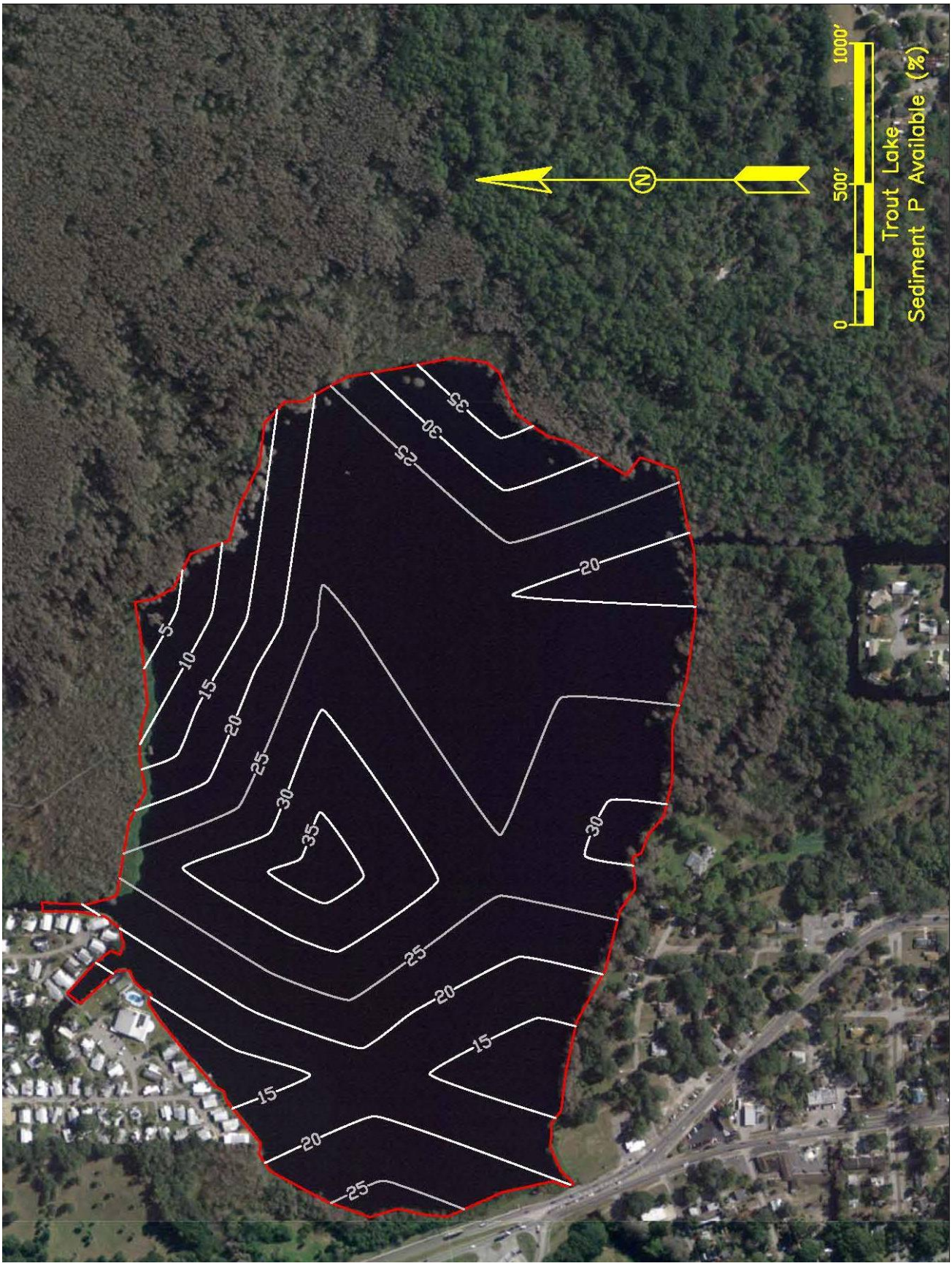


Figure 2-25. Isopleths of Available Sediment Phosphorus Concentrations (% of sediment total phosphorus) in the Top 10 cm of Sediments in Trout Lake.

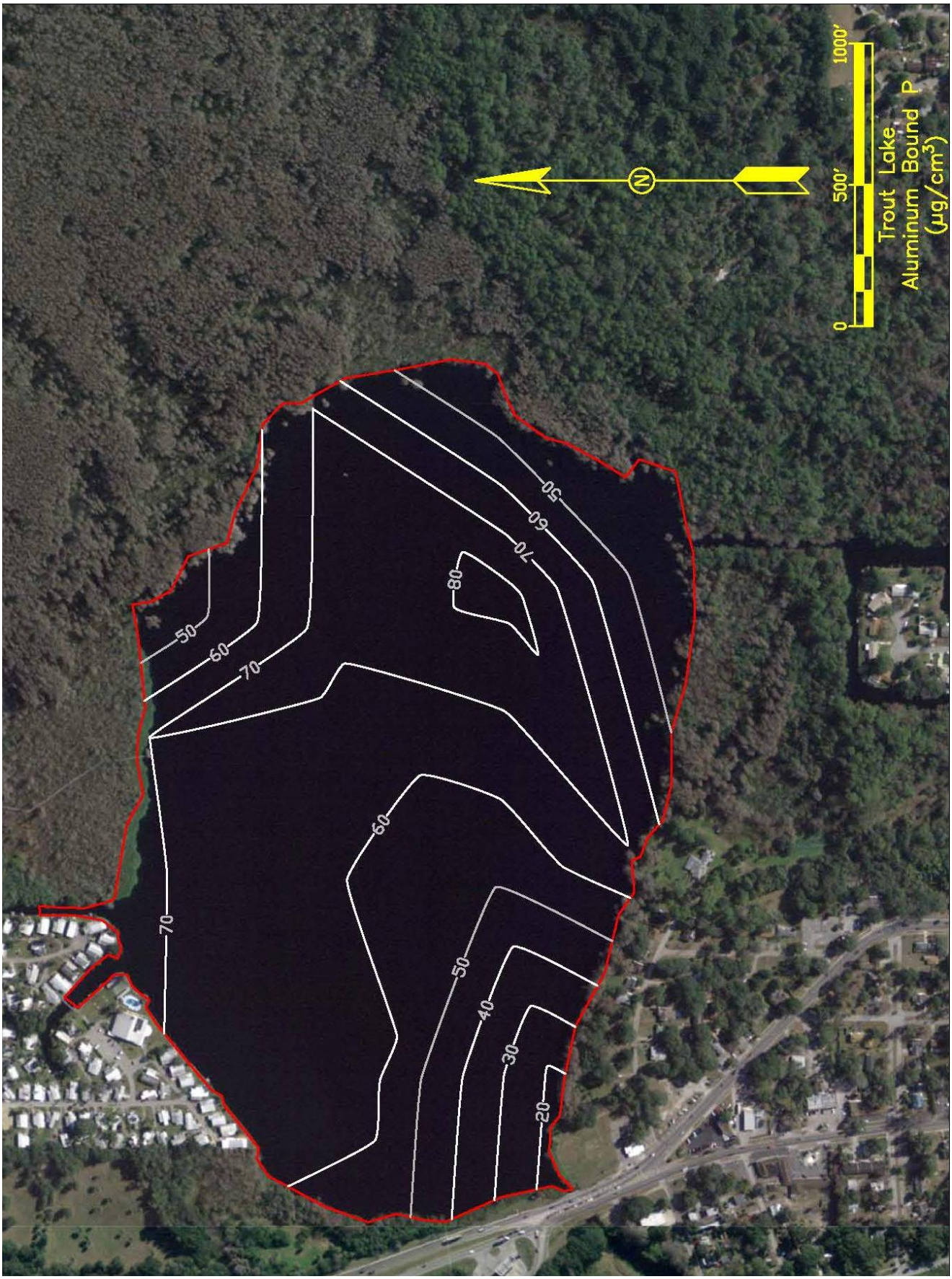


Figure 2-26. Isopleths of Aluminum-Bound Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Trout Lake.

TABLE 2-13

PHOSPHORUS SPECIATION IN THE TOP 10 cm OF SEDIMENT CORE SAMPLES COLLECTED IN LAKE YALE ON JANUARY 29-30, 2015

SITE	SEDIMENT PHOSPHORUS SPECIATION ($\mu g/cm^3$)				SEDIMENT PHOSPHORUS AVAILABLE (%)
	Saloid-Bound	Iron-Bound	Total Available	Aluminum-Bound	
1	1.4	61	63	50	18
2	0.2	107	108	3	20
3	0.8	76	77	16	21
4	6.1	58	64	50	17
5	1.6	99	100	15	22
6	1.4	101	102	20	21
7	1.9	87	89	11	21
8	1.2	87	88	13	24
9	1.4	51	52	41	25
10	0.4	43	43	62	11
11	0.8	91	91	18	21
12	0.1	91	91	24	16
13	6.0	58	64	48	15
14	1.1	94	95	28	15
15	1.2	96	97	13	25
16	2.1	40	42	29	23
17	2.4	62	64	33	24
18	4.2	46	50	19	25
19	0.5	117	118	12	27
20	0.1	98	98	39	19
21	7.0	82	89	105	24
22	9.2	46	55	28	17
23	4.3	98	102	17	18
24	4.1	93	97	20	23
25	4.7	47	52	34	28
26	11.2	48	59	27	23
27	5.5	111	117	26	30
28	1.9	62	64	127	38
29	5.0	94	99	17	23
30	6.2	96	102	17	19
31	8.4	95	103	21	20
32	14.7	31	46	19	10
Minimum	**0.1**	**31**	**42**	**3**	**10**
Maximum	**15**	**117**	**118**	**127**	**38**
Mean	**2.0**	**73**	**77**	**24**	**21**

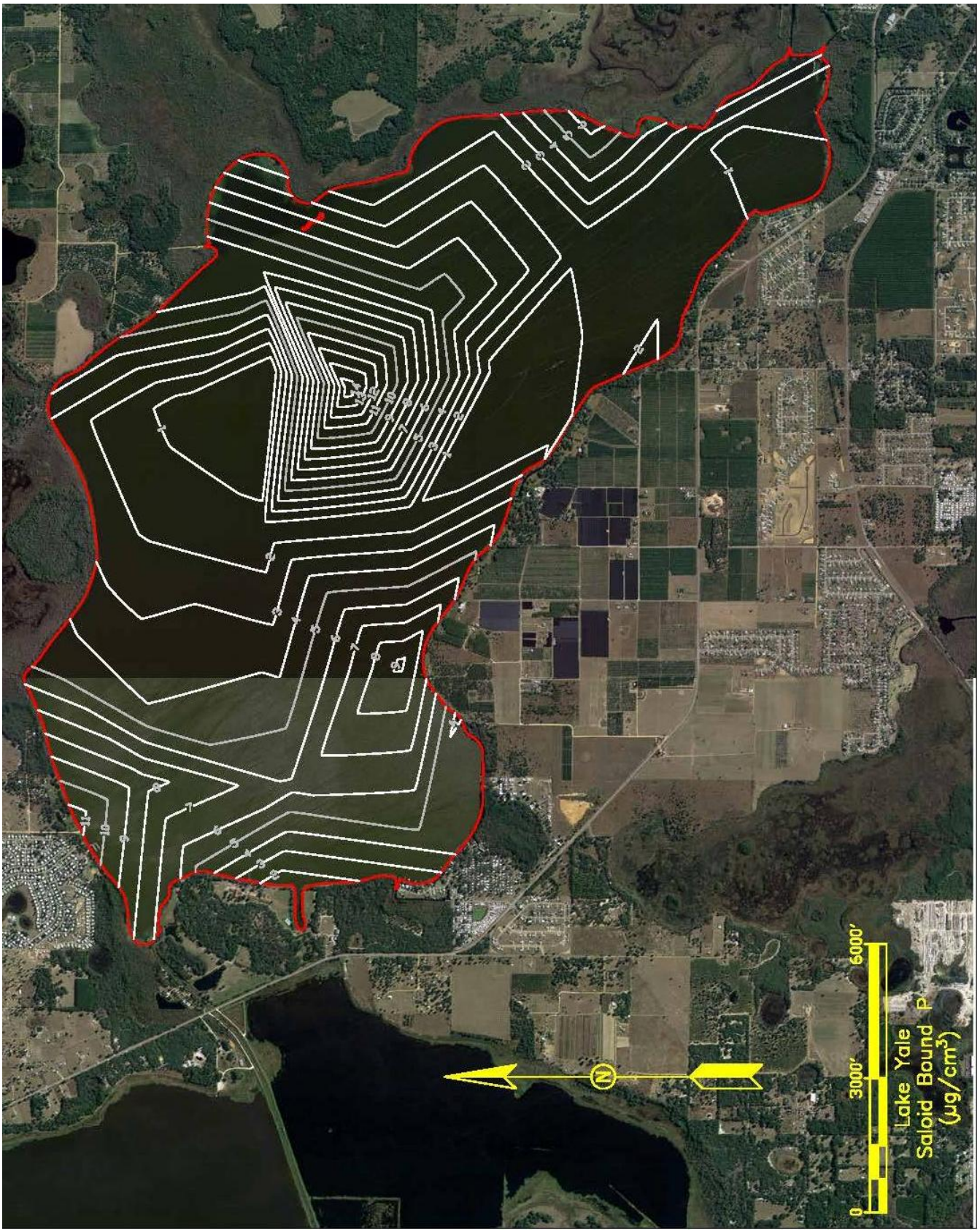


Figure 2-27. Isopleths of Saloid-Bound Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Lake Yale.

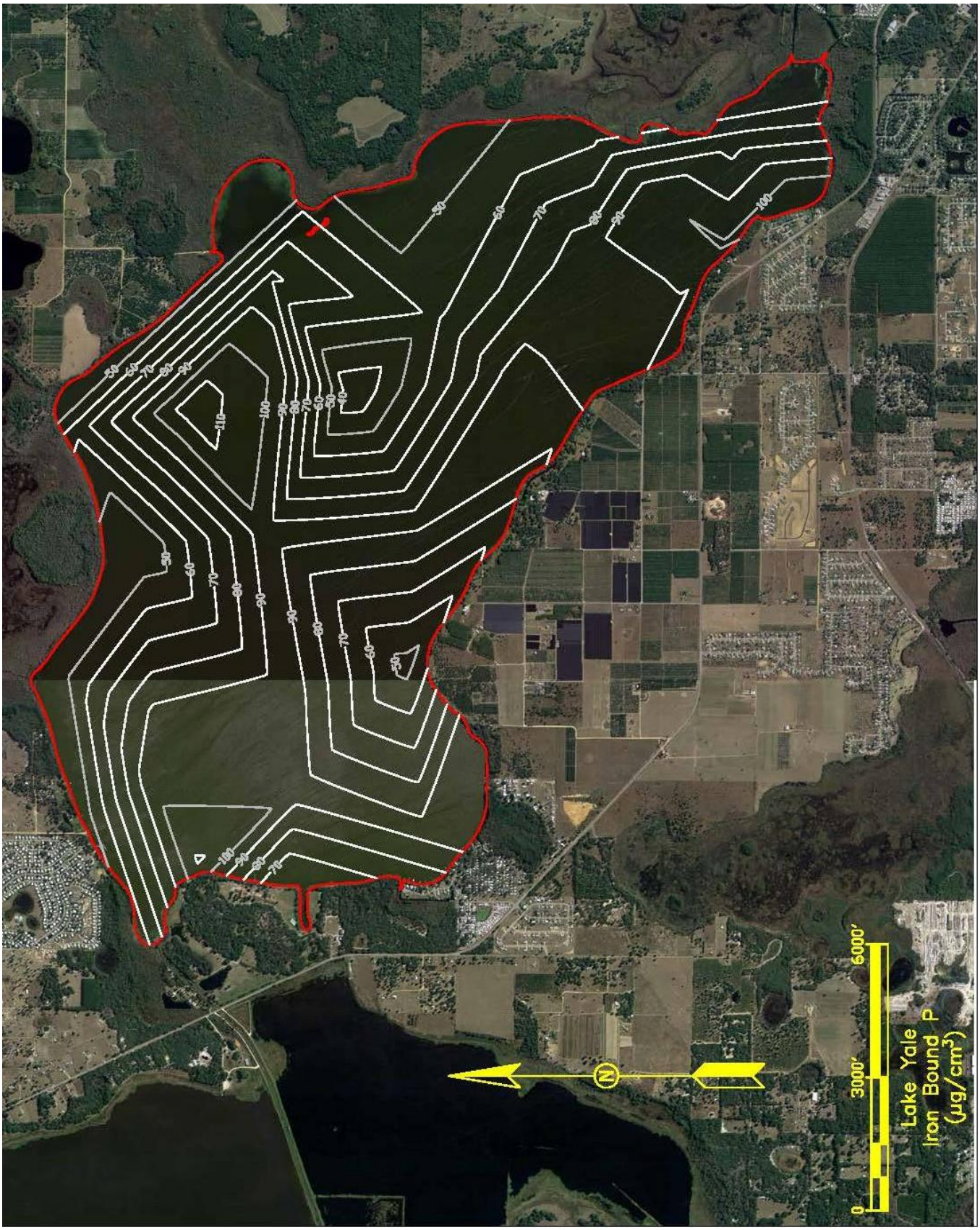


Figure 2-28. Isopleths of Iron-Bound Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Lake Yale.

Isopleths of total available phosphorus in the top 10 cm of sediments in Lake Yale are provided on Figure 2-29. The most elevated concentrations of total available phosphorus were observed in central portions of the lake where concentrations ranged from 50-110 $\mu g/cm^3$. Slight decreases in total available phosphorus concentrations were observed in shoreline areas, although not to the extent exhibited by other sediment parameters.

As indicated on Table 2-13, available sediment phosphorus comprised approximately 10-38% of the overall total phosphorus present in the sediments of Lake Yale, with an overall geometric mean of 21%. Isopleths of available phosphorus as a percentage of total sediment phosphorus in the top 10 cm of sediments in Lake Yale are provided on Figure 2-30. In contrast to the trends observed for available phosphorus concentrations, the percentage of sediment phosphorus which is available within the sediments appears to be lowest in central portions of the lake, increasing steadily towards shoreline portions of the lake.

Aluminum-bound sediment phosphorus, which reflects an unavailable form of phosphorus within the sediments, ranged from 3-127 $\mu g/cm^3$, with an overall geometric mean of 24 $\mu g/cm^3$. Isopleths of aluminum-bound phosphorus in the top 10 cm of sediments in Lake Yale are provided on Figure 2-31. The most elevated areas of aluminum-bound phosphorus were observed along the northeast and west portions of the lake where isopleth contours ranged from approximately 30-100 $\mu g/cm^3$. Central portions of the lake are characterized by substantially lower concentrations of aluminum-bound phosphorus, ranging from 20-30 $\mu g/cm^3$.

2.3 Historical Water Quality Characteristics of Trout Lake and Lake Yale

Relatively extensive historical water quality monitoring has been conducted in both Trout Lake and Lake Yale, with more than 20 years of historical data available for each lake from multiple agencies. A discussion of historical water quality characteristics in the two lakes is given in the following sections. All mean values provided in this section reflect geometric mean values since the data exhibit a log-normal distribution.

2.3.1 Trout Lake

A summary of available historical water quality data for Trout Lake is given in Table 2-14. The most significant historical data collection has been conducted by LakeWatch which provided analyses for surface water samples collected by volunteers at three monitoring sites in Trout Lake over the period from 1993-2011. Sample collection was conducted at each of the three sites in Trout Lake on approximately a monthly basis, with a total of 658 separate samples collected as part of this effort. Each of the collected surface water samples was analyzed for the standard LakeWatch parameters of total nitrogen, total phosphorus, chlorophyll-a, and Secchi disk depth. Sporadic measurements of color and conductivity were also provided. Each of the LakeWatch samples was collected at a depth of 0.5 m.

Additional historical water quality monitoring was conducted in Trout Lake by SJRWMD at a station identified as 44576. Monitoring at this site was conducted by SJRWMD from January 2000-June 2015, with a monitoring frequency ranging from semi-annual to monthly and a total of 84 separate monitoring events. The monitoring conducted by SJRWMD included field parameters, nutrients, general parameters, chlorophyll-a, Secchi disk depth, and metals.

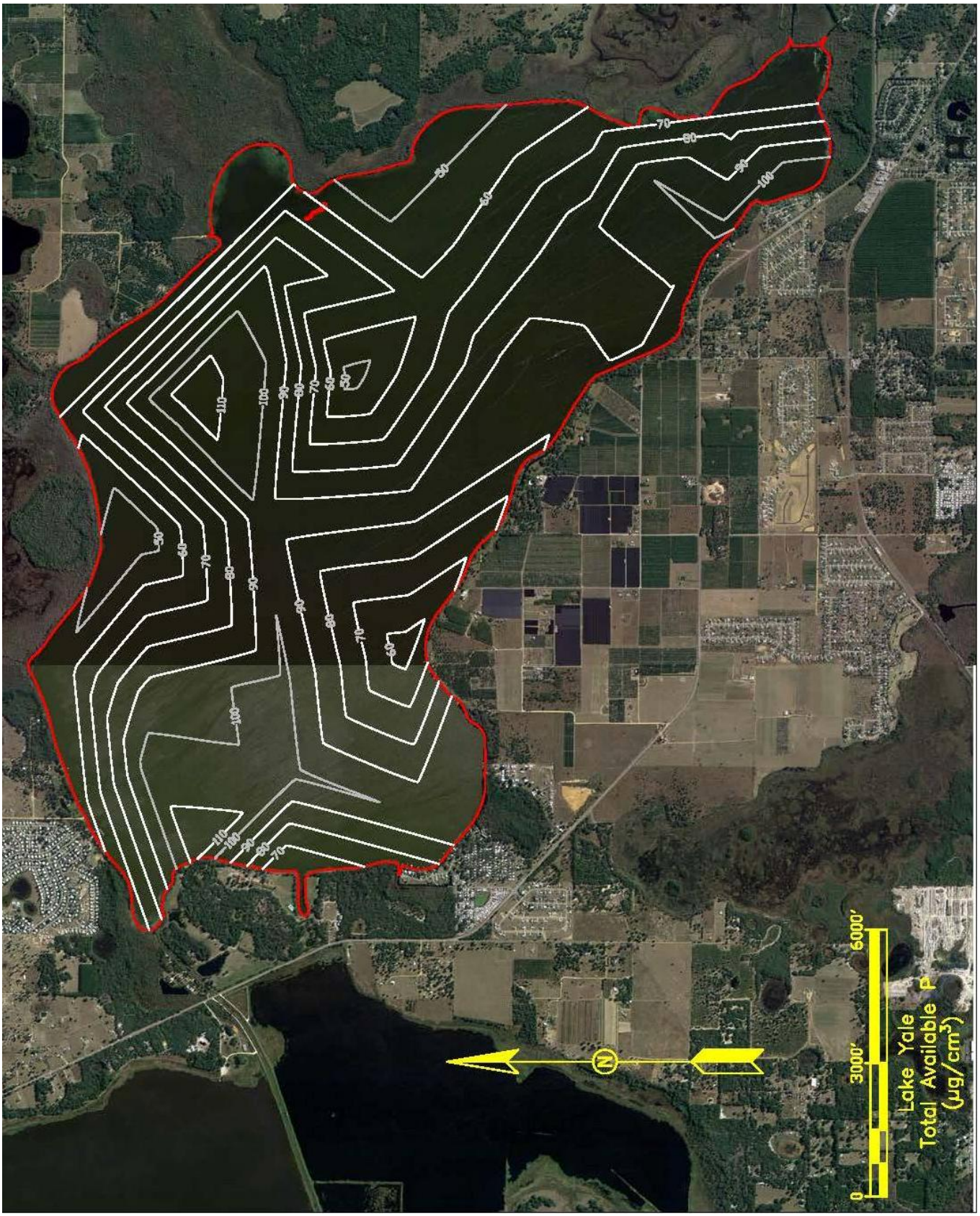


Figure 2-29. Isopleths of Total Available Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Lake Yale.

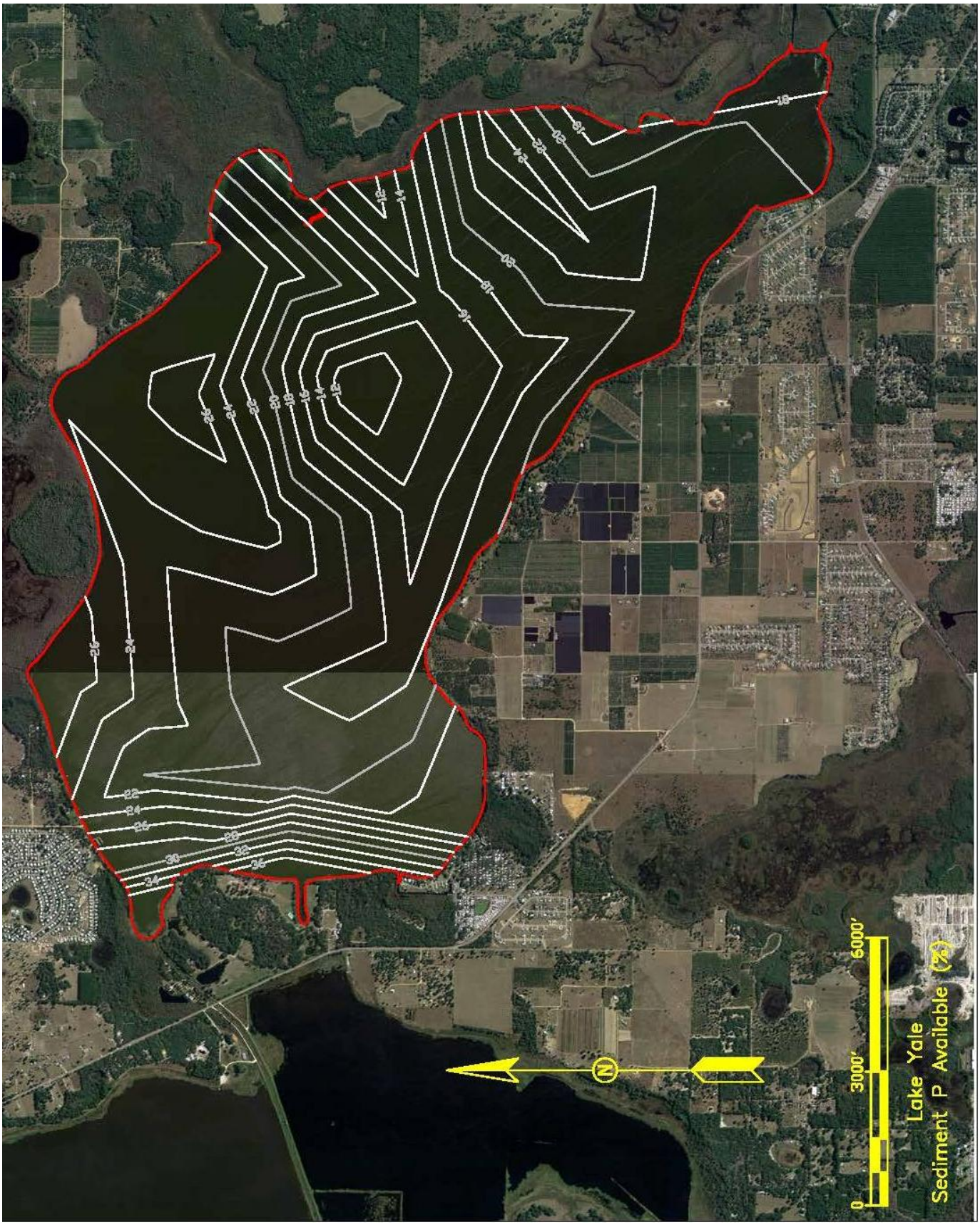


Figure 2-30. Isopleths of Available Sediment Phosphorus Concentrations (% of sediment total phosphorus) in the Top 10 cm of Sediments in Lake Yale.

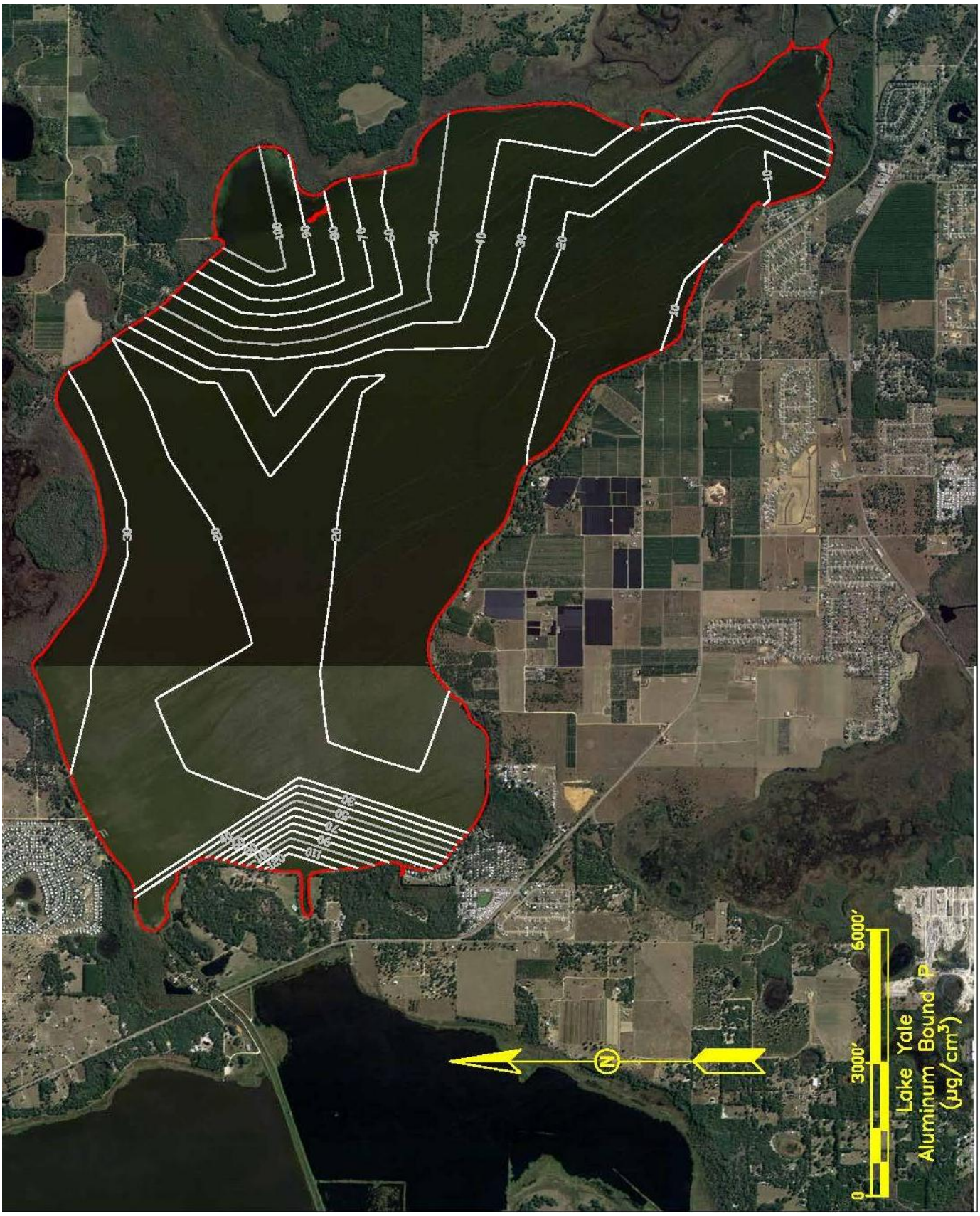


Figure 2-31. Isopleths of Aluminum-Bound Phosphorus Concentrations (µg/cm^3) in the Top 10 cm of Sediments in Trout Lake.

TABLE 2-14

SUMMARY OF AVAILABLE HISTORICAL WATER QUALITY DATA FOR TROUT LAKE

AGENCY	STATION ID	COLLECTION PERIOD	MONITORING FREQUENCY	NUMBER OF EVENTS	DATA COLLECTED
LakeWatch	Trout-1	2/93-12/11	Monthly	219	Total Nitrogen, Total Phosphorus, Chlorophyll-a, Secchi Depth, Color (sporadic), and Conductivity (sporadic)
	Trout-2	2/93-12/11	Monthly	220	Total Nitrogen, Total Phosphorus, Chlorophyll-a, and Secchi Depth
	Trout-3	2/93-12/11	Monthly	219	Total Nitrogen, Total Phosphorus, Chlorophyll-a, and Secchi Depth
SJRWMD	44576	1/00-6/15	2000: 2 events 2004-2006: Quarterly 2007-2009: Monthly 2010-2015: Quarterly	84	Field Parameters, Nutrients, General Parameters, Chlorophyll-a, Secchi Depth, and Metals

Locations of the historical water quality monitoring sites in Trout Lake used by LakeWatch and SJRWMD are indicated on Figure 2-32. The LakeWatch data provide the same coordinates for each of the three monitoring sites in Trout Lake at a location near the center of the lake. The SJRWMD monitoring site, identified as Site 44576, is located slightly west of the center of the lake. A complete listing of the available historical water quality for Trout Lake from LakeWatch and SJRWMD is provided in Appendix B-1 and B-2, respectively.

A historical data set for Trout Lake was developed by ERD using the available data collected by LakeWatch and SJRWMD. This data set included significant trophic state variables, such as total nitrogen, total phosphorus, chlorophyll-a, and Secchi disk depth. Calculated TN/TP ratios and Trophic State Index (TSI) values were also included. The historical data set includes all of the available data collected by LakeWatch. However, the SJRWMD data set includes a large number of total phosphorus values which appear to be artificially low in value, are not consistent with phosphorus measurements conducted by LakeWatch, and do not correlate with corresponding chlorophyll-a measurements conducted on the same samples. Beginning in October 2006 and extending until September 2008, the reported total phosphorus concentrations from SJRWMD appear to be an order of magnitude lower than values commonly observed in Trout Lake. In addition, the reported total phosphorus values do not match the magnitude of chlorophyll-a concentrations measured on the same samples. This trend appears to resurface in October 2011 and extends, on a sporadic basis, until August 2014. As a result, the entire SJRWMD phosphorus data set was eliminated from the overall historical database used to evaluate water quality trends for Trout Lake. However, the concentrations of total nitrogen, chlorophyll-a, and Secchi disk depth reported by SJRWMD are retained for the overall historical data set. In addition, historical color measurements conducted by SJRWMD are also included in the historical data set. Removal of total phosphorus values contained in the SJRWMD data resulted in a data set for total phosphorus which ended in 2011 when the LakeWatch data stop. The combined data set contains a total of 740 individual samples.

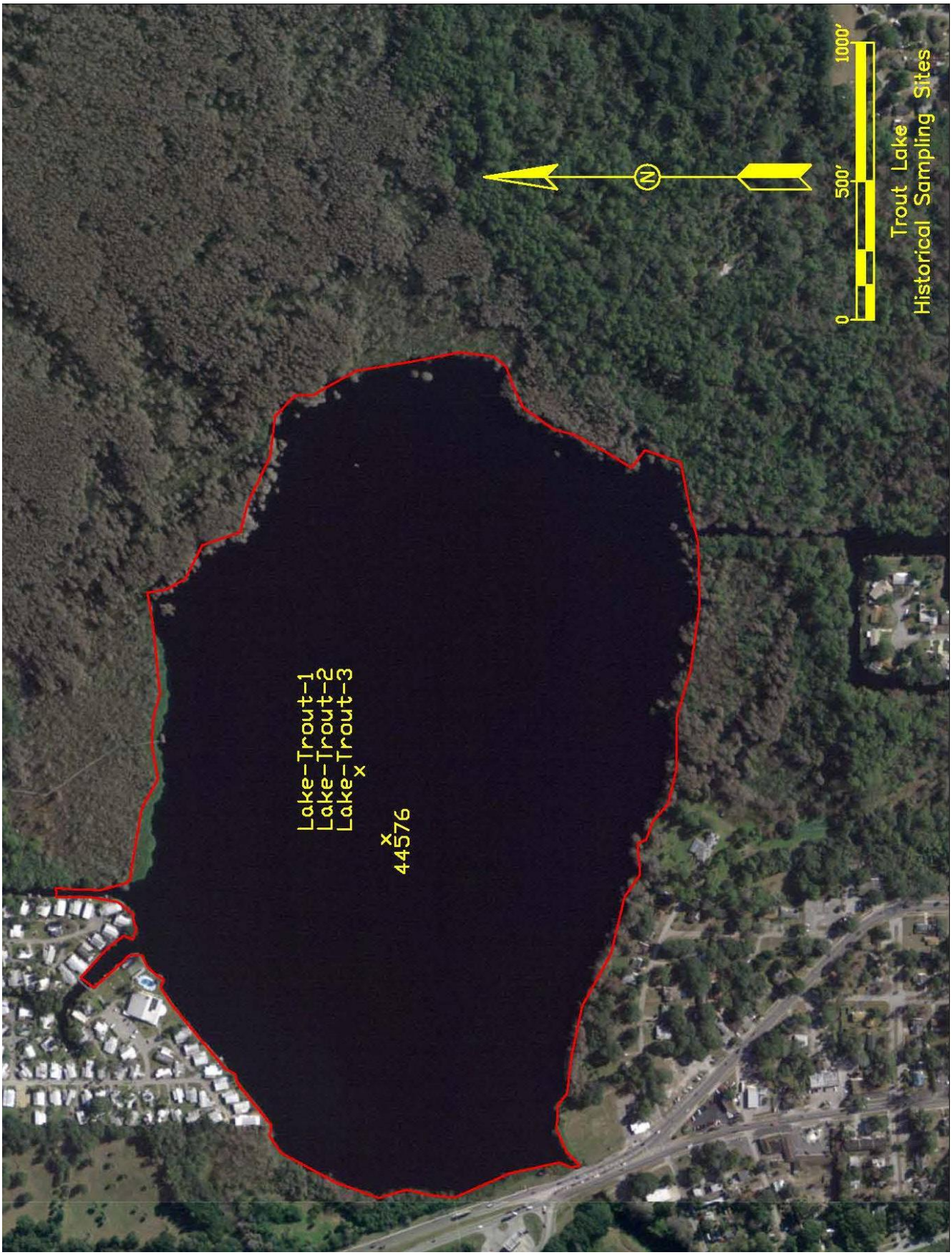


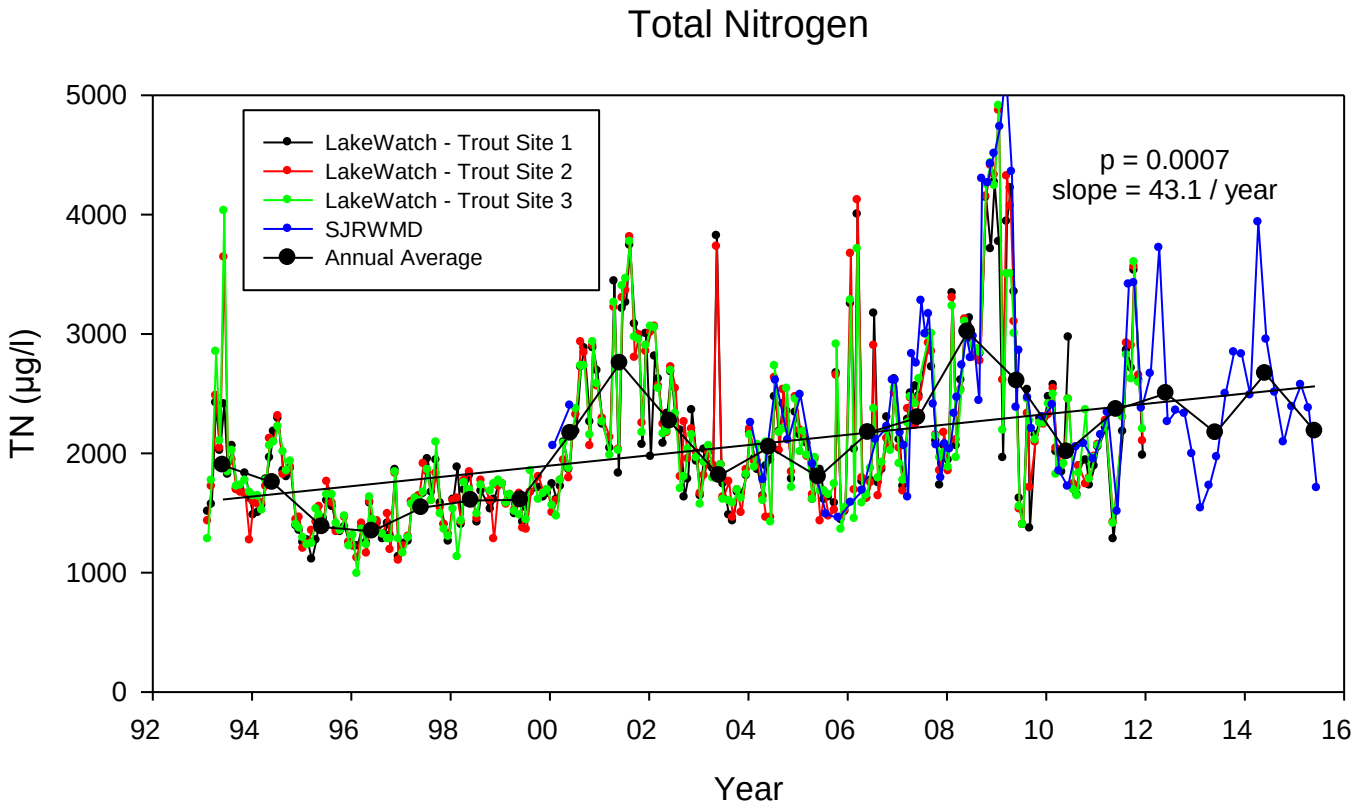
Figure 2-32. Historical Water Quality Monitoring Sites in Trout Lake.

Historical water quality characteristics in Trout Lake were evaluated by ERD based upon an examination of results from individual monitoring events as well as mean annual concentrations of total nitrogen, total phosphorus, chlorophyll-a, Secchi disk depth, TN/TP ratio, and TSI for the combined historical data set. A summary of historical trends in total nitrogen and total phosphorus in Trout Lake from 1993-2015 is given in Figure 2-33. Mean annual average values for total nitrogen and total phosphorus are superimposed over the historical data to provide a less cluttered view of potential water quality trends for these parameters within the lake. A trend line is also provided to assist in identifying significant water quality trends which is obtained using linear regression techniques using the annual average values. The calculated probability value (p value) is also included which provides the level of significance associated with each regression model. A model which is significant at a 95% confidence level is associated with a p value of 0.05. However, lakes exhibit normal seasonal cyclic variations in water quality which can reduce the statistical significance of the regression model and led to potentially incorrect conclusions concerning the significance of water quality relationships. Therefore, for evaluating water quality trends in lakes, a p value of 0.1 or less is generally considered to indicate a significant statistical trend, while p values greater than 0.1 suggest an insignificant trend.

Measured total nitrogen concentrations in Trout Lake from 1993-2015 ranged from approximately 900 μg/l to more than 5,000 μg/l between the individual monitoring dates, although the vast majority of measurements appear to range from approximately 1,000-3,000 μg/l. Total nitrogen concentrations have exhibited a moderate degree of variability over time in Trout Lake, with a relatively close agreement between nitrogen concentrations measured by LakeWatch and SJRWMD. A general trend of increasing nitrogen concentrations is apparent in Trout Lake over the period of record, and based upon the calculated p value of 0.0007, this trend is statistically significant.

Measured total phosphorus concentrations in Trout Lake have been highly variable over time, with measured values ranging from less than 100 μg/l to more than 600 μg/l, although the majority of measured values appear to be in the range of 100-400 μg/l. A relatively close agreement in phosphorus concentrations is apparent between the three LakeWatch sites throughout the available period of record. However, the SJRWMD phosphorus measurements appear to deviate substantially from the phosphorus concentrations measured by LakeWatch, particularly during the periods of 2007-2008 and from 2011-2014. As a result, these data are not included in the calculations for annual mean total phosphorus concentrations. A general trend of increasing phosphorus concentrations has occurred in Trout Lake over time, and based upon the calculated p value of 0.0307, this trend is statistically significant.

A summary of historical trends in measured concentrations for chlorophyll-a and Secchi disk depth in Trout Lake from 1993-2015 is given on Figure 2-34. Measured chlorophyll-a values in Trout Lake have been highly variable over the available period of record, ranging from near 0 mg/m^3 to more than 500 mg/m^3, although the vast majority of measurements appear to be between 50-200 mg/m^3. Long-term peaks in chlorophyll-a concentrations were observed in Trout Lake from 2000-2002, 2006-2008, and 2011-2012, similar to the trends observed for total nitrogen and to a lesser extent total phosphorus. The calculated trend line for the annual average chlorophyll-a concentrations has a negative slope which indicates a decreasing trend in chlorophyll-a concentrations over time. However, the calculated p value of 0.6197 for this relationship indicates that the trend is not statistically significant.



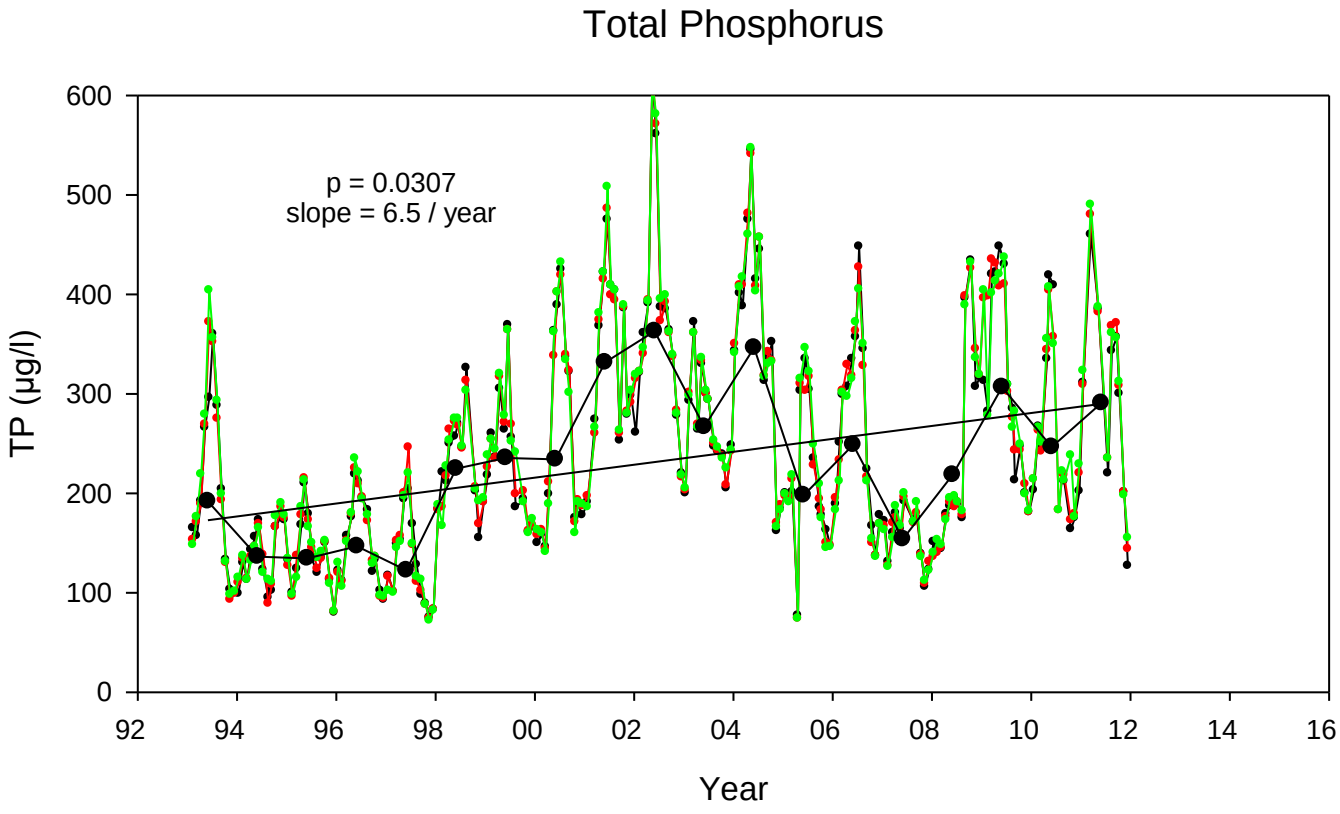
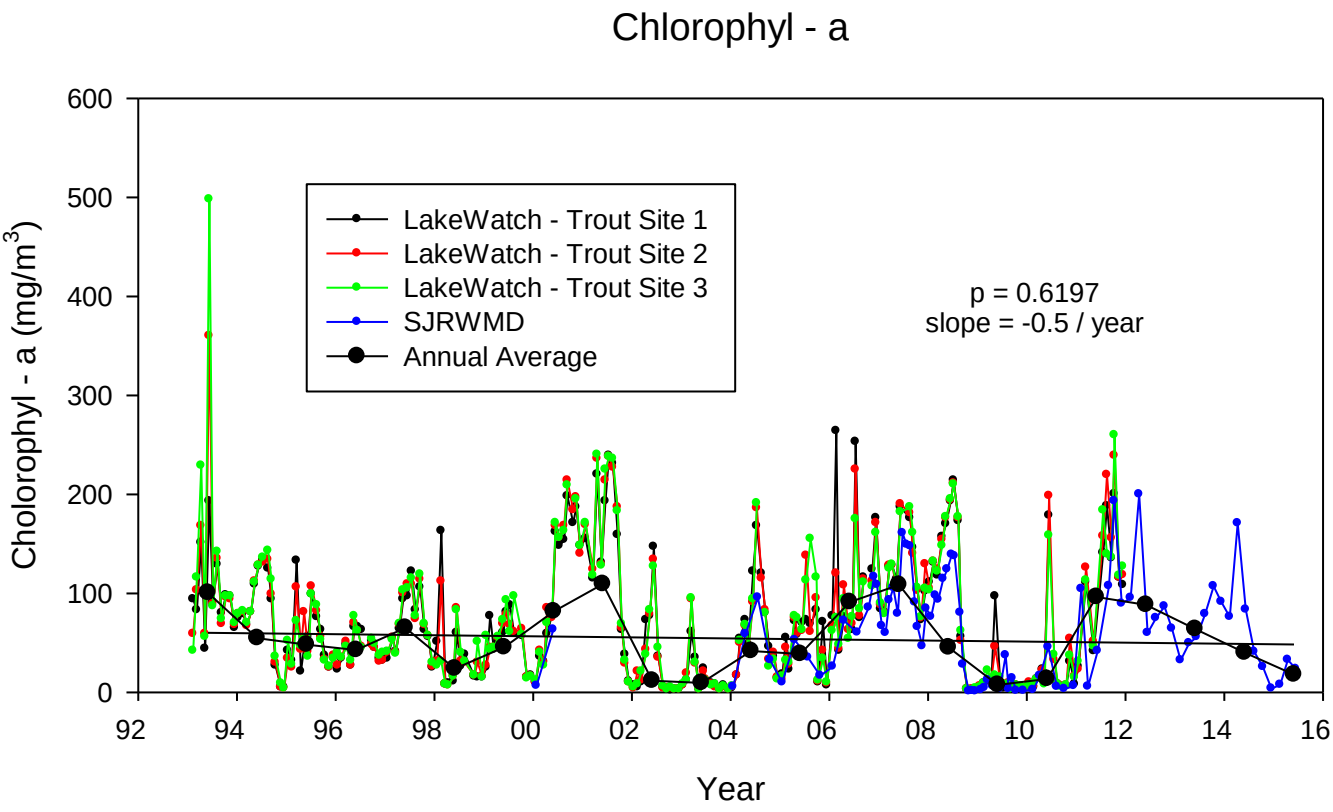


Figure 2-33. Trends in Total Nitrogen and Total Phosphorus in Trout Lake from 1993-2015.



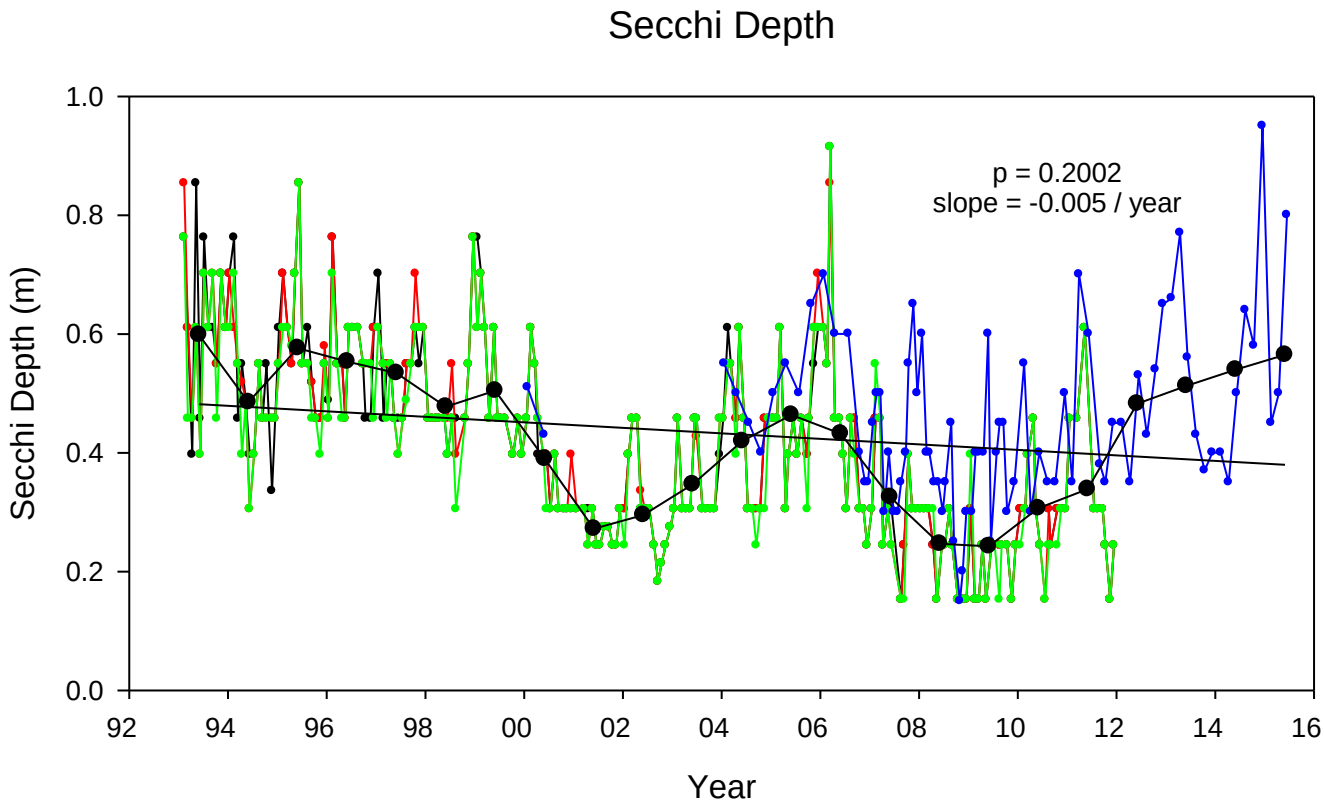


Figure 2-34. Trends in Chlorophyll-a and Secchi Disk Depth in Trout Lake from 1993-2015.

Measured Secchi disk depths in Trout Lake have also been highly variable over time, ranging from approximately 0.2-0.9 m. These relatively poor Secchi disk depths are related to a combination of the high color of the water in Trout Lake combined with the elevated chlorophyll-a concentrations observed at times. The trend line for the annual average Secchi disk depths indicates a negative slope, suggesting that Secchi disk depths are decreasing in Trout Lake over time. However, the calculated p value of 0.2002 suggests that the trend is not statistically significant.

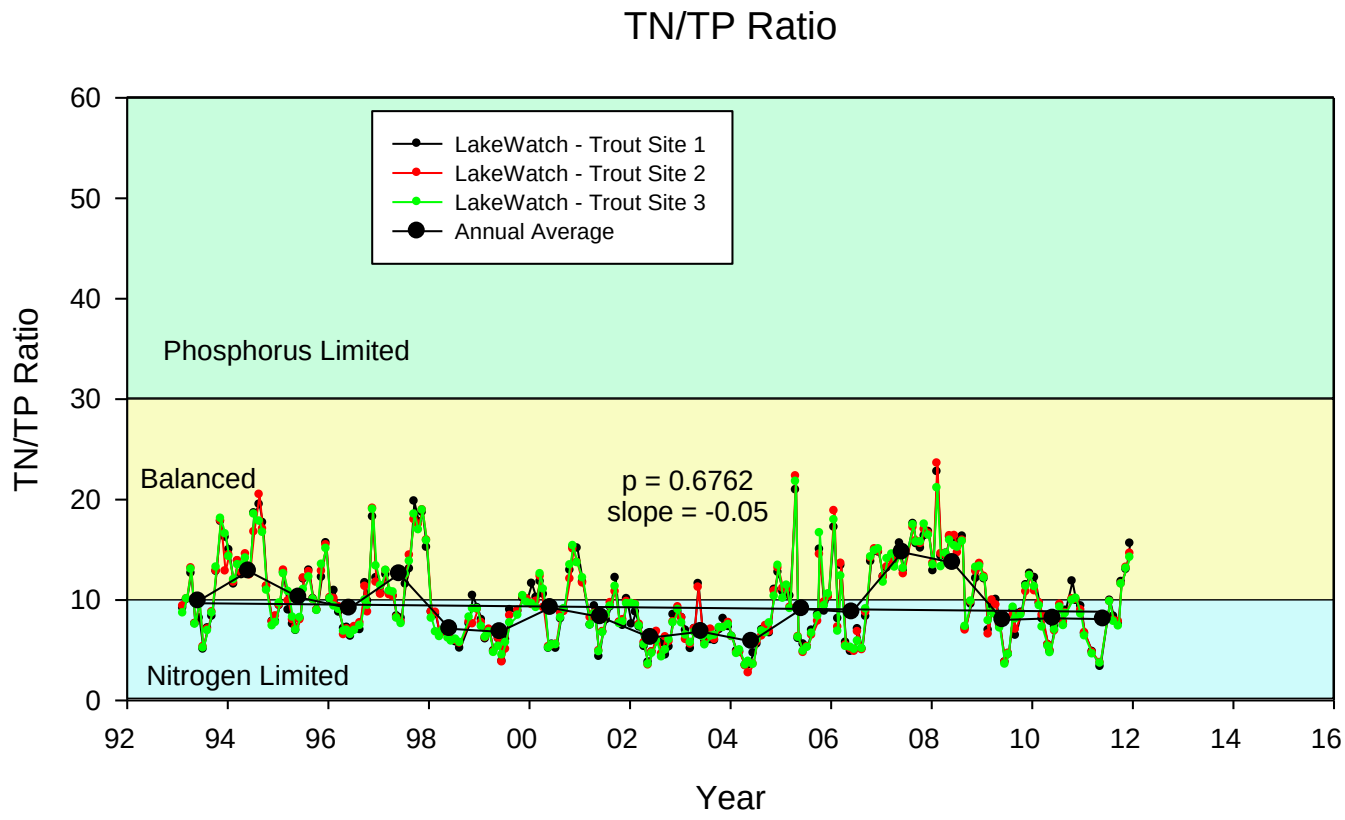
Nutrient limitation in a waterbody is often evaluated using the total nitrogen/total phosphorus (TN/TP) ratio. The calculated TN/TP ratio is a numerical ratio of the measured water column concentrations of total nitrogen and total phosphorus. This ratio is useful in evaluating the relative significance of nitrogen and phosphorus in regulating primary productivity (algal growth) in a waterbody. Measured TN/TP ratios less than 10 are considered to indicate nitrogen-limited conditions, suggesting that phosphorus is relatively abundant and nitrogen is the element which regulates primary productivity and the growth of algae within the lake system. Calculated TN/TP ratios between 10-30 indicate nutrient-balanced conditions, with both nitrogen and phosphorus considered important for limiting aquatic growth. Calculated TN/TP ratios in excess of 30 indicate phosphorus-limited conditions, which suggests that nitrogen is abundant within the system and algal growth is limited by the availability of phosphorus. This is the typical situation observed in many lakes in the Central Florida area. However, the nitrogen/phosphorus ratio only applies to additional algal growth in the waterbody and does not necessarily relate to algal responses to nutrient load reductions.

A summary of trends in annual TN/TP ratios in Trout Lake from 1993-2015 is given on Figure 2-35. The TN/TP ratio data suggest that Trout Lake has existed in either a nitrogen-limited or balanced nutrient condition throughout most of the historical monitoring period. However, calculated TN/TP ratios only apply to additional algal growth within Trout Lake and do not necessarily provide information on which nutrient should be controlled to reduce, rather than increase, algal productivity.

Trophic State Index (TSI) values were also calculated for each monitoring event in Trout Lake over the available period of historical data. TSI is a summary statistic which incorporates measured concentrations of significant parameters in lake systems and is often considered the best overall indicator of the health of a lake system. Calculated TSI values less than 50 indicate oligotrophic conditions, representing lakes with low nutrient loadings and good to excellent water quality characteristics. Calculated TSI values from 50-60 indicate mesotrophic or fair water quality characteristics. Calculated TSI values between 60-70 indicate eutrophic or poor water quality characteristics, with hypereutrophic conditions, reflecting very poor water quality, indicated by TSI values in excess of 70.

The trophic state index was developed by Carlson (1977) as a relative measure of the degree of biological productivity in lakes. The TSI concept incorporates forcing functions such as nutrient supplies, light availability, seasonality, and other factors. Since the TSI value is intended to reflect the level of biological productivity, the best estimator for productivity is chlorophyll-a. Some calculations also incorrectly include concentrations of nutrients and Secchi disk depth in addition to chlorophyll-a, but nutrients and Secchi disk depth should only be included as surrogates for biological productivity in TSI calculations when chlorophyll data are not available. Due to the relatively robust historical data set for chlorophyll-a in Trout Lake, all TSI calculations for this analysis are performed using concentrations of chlorophyll-a only according to the following relationship:

$$TSI\ (Chly\text{-}a) = 16.8 + 14.4\ (ln\ Chly\text{-}a)$$



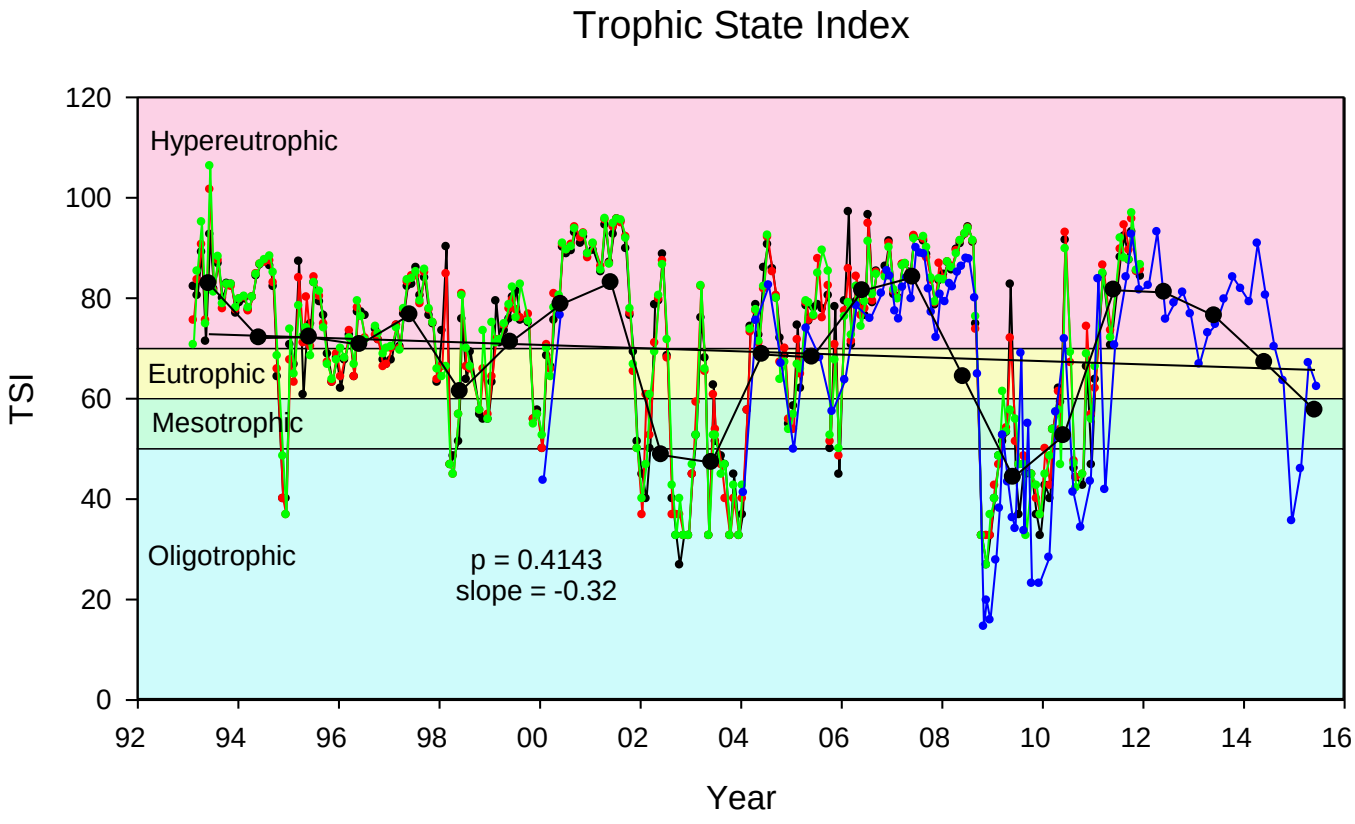


Figure 2-35. Trends in TN/TP Ratio and TSI Values in Trout Lake from 1993-2015.

Trends in TSI values in Trout Lake from 1993-2015 are also summarized on Figure 2-35. Over the available period of record, Trout Lake has fluctuated from oligotrophic to hypereutrophic conditions based upon measurements of chlorophyll-a. The trend line through the annual average TSI values indicates a decreasing trend of TSI in Trout Lake over time, but the calculated p value of 0.4143 indicates that the trend is not statistically significant.

A tabular summary of annual geometric mean values for significant trophic state variables in Trout Lake from 1993-2015 is given on Table 2-15. The values summarized in this table are based upon the combined historical data set with both LakeWatch and SJRWMD data with the exclusion of the SJRWMD total phosphorus data. Annual geometric mean total nitrogen concentrations in Trout Lake have ranged from 1,346-3,016 μg/l based upon the historical data set. Total nitrogen concentrations in this range are somewhat elevated compared with nitrogen concentrations commonly observed in Central Florida lakes.

TABLE 2-15

ANNUAL GEOMETRIC MEAN VALUES FOR SIGNIFICANT TROPHIC STATE VARIABLES IN TROUT LAKE FROM 1993-2015

DATE	PARAMETER						
	Total Nitrogen (μg/l)	Total Phosphorus (μg/l)	Chlorophyll-a (mg/m^3)	Secchi Disk Depth (m)	TN/TP Ratio	TSI (Chyl-a)	Color (Pt-Co)
1993	1,899	192	101	0.60	10	83	--
1994	1,755	136	54.7	0.49	13	72	--
1995	1,382	134	48.1	0.58	10	72	--
1996	1,346	147	42.8	0.55	9	71	--
1997	1,543	123	65.2	0.53	13	77	--
1998	1,604	225	23.8	0.48	7	61	--
1999	1,609	235	45.5	0.50	7	71	--
2000	2,165	234	81.7	0.39	9	79	179
2001	2,755	332	109	0.27	8	83	128
2002	2,267	363	11.7	0.30	6	49	397
2003	1,812	267	9.4	0.35	7	47	323
2004	2,048	346	41.6	0.42	6	69	187
2005	1,801	198	38.6	0.46	9	68	247
2006	2,173	249	91.1	0.43	9	81	97
2007	2,298	154	109	0.33	15	84	56
2008	3,016	219	45.3	0.25	14	64	159
2009	2,605	307	7.4	0.24	8	44	546
2010	2,010	246	13.6	0.31	8	53	305
2011	2,366	291	96.2	0.34	8	82	83
2012	2,501	--	88.4	0.48	--	81	43
2013	2,171	--	64.0	0.51	--	76	51
2014	2,668	--	40.1	0.54	--	67	186
2015	2,185	--	18.0	0.56	--	58	304
Mean	**2,086**	**231**	**54.2**	**0.43**	**9**	**69**	**206**

Mean annual geometric mean concentrations of total phosphorus in Trout Lake have ranged from 123-363 μg/l, reflecting extremely elevated values for a Central Florida lake. However, as indicated by the geometric mean values for color, the water column in Trout Lake is extremely colored, and elevated concentrations of total phosphorus are common in highly colored waterbodies which receive significant wetland inflows.

Measured concentrations of chlorophyll-a in Trout Lake have been highly variable over the available period of record, ranging from 7.4-109 mg/cm^3. Many color compounds can act as natural algicides and may create an inverse relationship between color and concentrations of chlorophyll-a, with chlorophyll-a decreasing as color increases.

Measured Secchi disk depth values in Trout Lake have been extremely poor over the available period of record, with annual geometric meal values ranging from 0.24-0.60 m, reflecting poor water clarity. The observed low Secchi disk depths are a result of a combination of high algal productivity and high color, both of which restrict light penetration through the water column.

Measured TSI values in Trout Lake have also been highly variable, with annual geometric mean values ranging from 47-84, reflecting oligotrophic to hypereutrophic conditions. Large variability in TSI values are a characteristics of hypereutrophic lakes.

The historical water quality data collected by LakeWatch primarily include significant trophic state indicators, such as total nitrogen, total phosphorus, Secchi disk depth, and chlorophyll-a. However, in addition to these parameters, data collected by SJRWMD also include a number of general lake parameters as well. A summary of mean annual water quality characteristics of general water quality parameters in Trout Lake, other than the trophic state parameters mentioned previously, is given in Table 2-16. Geometric mean values are provided for each of the years for which historical data are available.

Mean annual pH values in Trout Lake have ranged from 5.99-8.70, reflecting acidic to alkaline conditions, with an overall mean pH value of 7.24. Measured dissolved oxygen concentrations in Trout Lake have been extremely variable over the historical data, with mean annual values ranging from 1.2-9.2 mg/l. As indicated in the SJRWMD historical data for Trout Lake summarized in Appendix B-2, dissolved oxygen concentrations in Trout Lake have been highly variable between individual monitoring dates, with measurements as low as 0.1 mg/l on multiple occasions. This is an extremely low value for a freshwater lake and few aquatic species can survive under these conditions for any extended period of time.

A probability distribution for measured dissolved oxygen concentrations in Trout Lake, based upon the SJRWMD data set, is given in Figure 2-36. Dissolved oxygen concentrations of 1 mg/l or less have been observed in approximately 11% of the measurements conducted in Trout Lake, with approximately 18% of the measurements equal to or less than 2 mg/l. Measured dissolved oxygen concentrations equal to 4 mg/l or less were observed in approximately 24% of the field samples. Dissolved oxygen concentrations of 5 mg/l or less, reflecting the long-term historical dissolved oxygen criterion for freshwater lakes, was observed in more than 30% of the measured values. The data suggest that dissolved oxygen depletion is a periodic problem in Trout Lake.

Trout Lake is characterized by low to moderate conductivity values, with annual geometric means ranging from 114-283 μmho/cm. The variability observed in the annual mean values is somewhat unusual for Central Florida lakes and is likely related to the presence or absence of significant wetland inflows into Trout Lake which contribute the vast majority of surface inflows to the lake.

TABLE 2-16

MEAN ANNUAL WATER QUALITY CHARACTERISTICS FOR GENERAL PARAMETERS AT THE SJRWMD STATION 44576 IN TROUT LAKE FROM 2000-2015

DATE	PARAMETER									
	pH (s.u.)	Dissolved Oxygen (mg/l)	Conductivity (µmho/cm)	Alkalinity (mg/l)	TSS (mg/l)	Turbidity (NTU)	Color (Pt-Co)	Chloride (mg/l)	TOC (mg/l)	Sulfate (mg/l)
2000	7.34	7.9	196	33.0	12.3	6.2	179	24.0	26.3	10.8
2004	6.71	3.1	114	31.1	5.3	5.7	205	18.9	26.9	6.1
2005	6.42	3.5	114	16.2	4.8	3.6	322	15.4	26.9	5.1
2006	6.96	3.3	140	18.3	15.3	13.8	83	20.8	20.1	6.7
2007	7.67	5.9	174	24.1	23.6	14.8	55	25.3	18.9	11.6
2008	7.29	4.8	178	20.7	12.8	8.1	164	21.5	30.0	19.5
2009	5.99	1.2	130	12.4	2.8	2.8	621	15.7	46.9	12.5
2010	6.73	2.4	117	16.4	2.7	1.8	356	15.6	29.2	6.0
2011	7.87	5.4	192	45.7	15.6	16.3	92	24.2	21.5	7.4
2012	8.70	9.2	263	78.2	21.5	17.3	43	25.1	17.8	11.7
2013	8.56	9.0	283	84.1	17.6	11.1	51	29.9	19.2	9.8
2014	7.40	5.9	180	47.0	5.3	6.5	186	20.5	31.1	6.3
2015	6.43	6.7	151	27.8	2.8	3.3	304	19.3	31.6	6.0
Mean	**7.24**	**5.3**	**172**	**35.0**	**11.0**	**8.6**	**205**	**21.3**	**26.6**	**9.2**

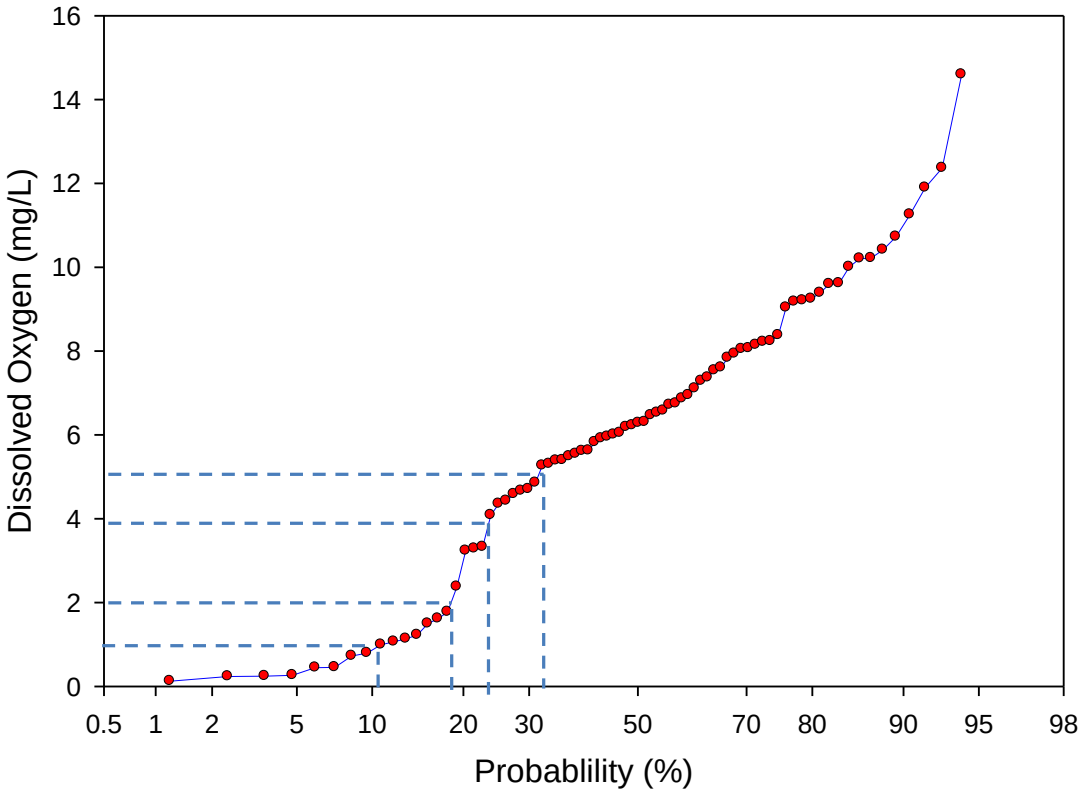


Figure 2-36.

Probability Distribution of Dissolved Oxygen Concentrations Measured in Trout Lake by SJRWMD from 2000-2015.

The surface water within Trout Lake has a low to moderate buffering capacity, with mean annual alkalinity values ranging from a low value of 12.4 mg/l to an elevated value of 84.1 mg/l. The variability in alkalinity values within the lake is also likely related to the presence or absence of significant wetland inflows into the lake which tend to be lower in both pH and alkalinity values.

Measured concentrations of TSS and turbidity have been highly variable and low to moderate in value over the period of historical data. Mean annual turbidity values have ranged from 1.8-17.3 NTU. The annual TSS concentrations have ranged from 2.7-23.6 mg/l, with values near the upper end of this range reflecting elevated values for an annual average in a Central Florida lake.

Measured color concentrations in Trout Lake have also been highly variable, with mean annual values ranging from 43-621 Pt-Co units, a range of more than an order of magnitude. The periods of elevated color are likely related to significant inflow events from the wetlands located on the north, east, and south sides of Trout Lake. Measured concentrations of total organic carbon (TOC) have also been highly variable and generally mimic the variability observed by color since color compounds in water are primarily organic in nature.

In contrast, measured chloride concentrations in Trout Lake have exhibited a substantially lower degree of variability than observed for other parameters, with mean annual values ranging from 15.4-29.9 mg/l. Overall, it appears that increases and decreases in chloride concentrations are somewhat related to the observed increases and decreases in color, with higher color concentrations related to lower chloride values.

Color appears to be a significant driving force in regulating water quality characteristics in Trout Lake. Color measurements in Trout Lake are a surrogate variable which is related to the significance of external inflows to Trout Lake from the surrounding wetland areas, with low in-lake color values associated with low volumetric inflows from the wetlands, and more elevated in-lake color concentrations representative of significant external inflows. There are no known significant internal sources of color in Trout Lake, so increases and decreases in color are likely related to the significance of external inflows.

A graphical comparison of relationships between color, pH, dissolved oxygen, conductivity, alkalinity, turbidity, and chloride in Trout Lake, based upon the SJRWMD data set, are summarized on Figure 2-37. Relatively strong relationships appear to exist between color and pH, conductivity, alkalinity, and chloride, with increases in color resulting in decreases in measured values for each of these parameters. These relationships suggest that the external inflows from the wetlands contain lower values for pH, conductivity, alkalinity, and chloride than commonly observed in Trout Lake, with increases in external inflows reducing in-lake concentrations for these parameters. The reverse relationship appears to occur for turbidity, where turbidity values within the lake appear to increase with increasing color and external inflows.

The relationship between color and dissolved oxygen in Trout Lake appears to be somewhat more complex, with both high and low values of dissolved oxygen observed at low and moderate color concentrations. However, there is some evidence that dissolved oxygen concentrations may decrease with increasing color concentrations. In the graph of dissolved oxygen vs. color, there appear to be 13 data points where dissolved oxygen concentrations in Trout Lake were equal to or less than 2 mg/l. In 9 of these 13 samples, color concentrations exceeded 400 Pt-Co units. In addition, at color concentrations of 400 Pt-Co units or more, the maximum dissolved oxygen concentrations observed in Trout Lake are near 6 mg/l compared with values in excess of 14 mg/l under low color conditions. Although there appears to be a relationship between color and dissolved oxygen, the relationship is not as well defined as observed for the remaining parameters.

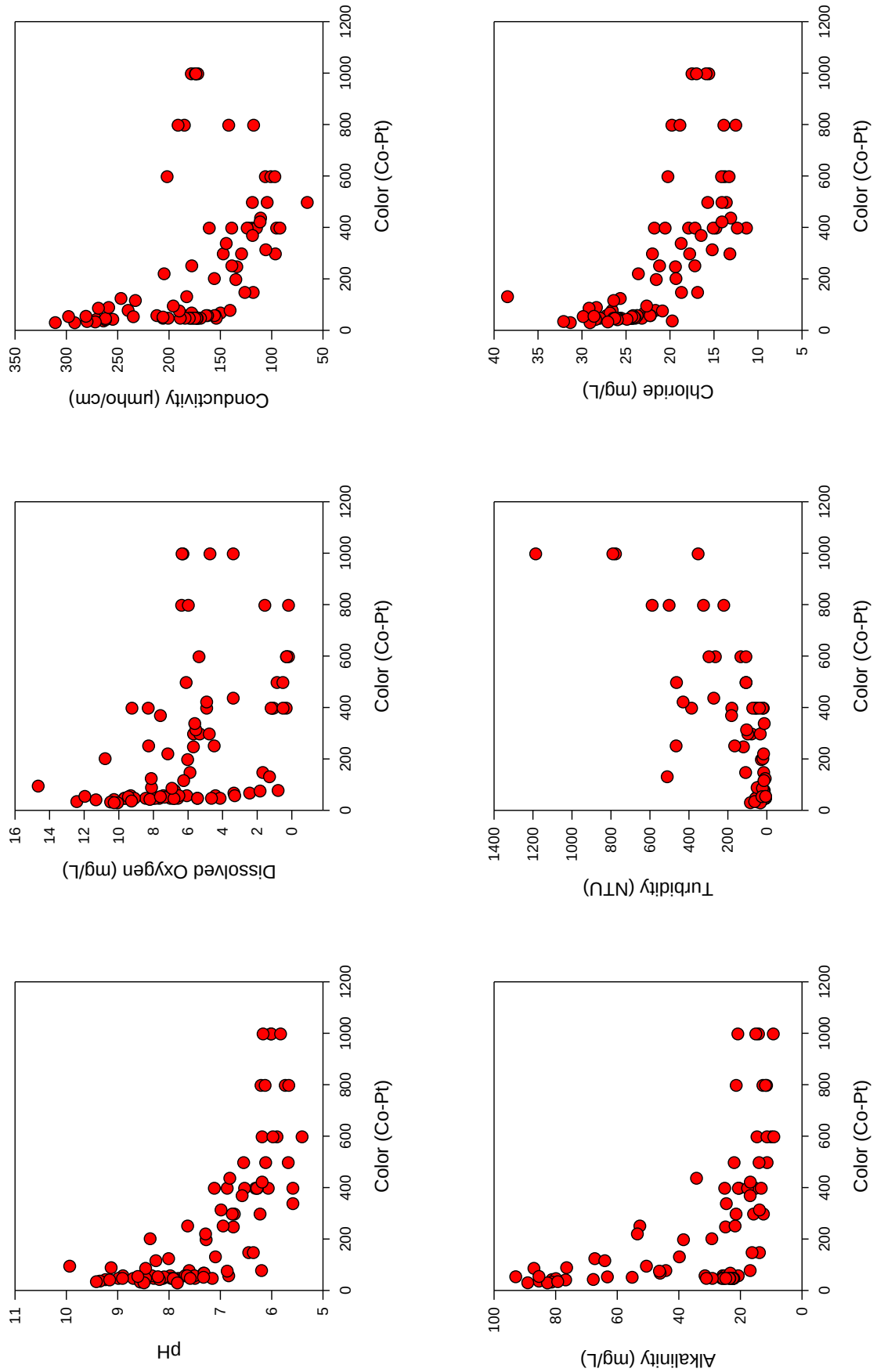


Figure 2-37. Relationships Between Color, pH, Dissolved Oxygen, Conductivity, Alkalinity, Turbidity, and Chloride in Trout Lake Based on the SJRWMD Data Set.

Graphical relationships between color, total nitrogen, TSI, ammonia, TOC, chlorophyll-a, and Secchi disk depth in Trout Lake, based on the SJRWMD data set, are provided on Figure 2-38. In-lake concentrations of total nitrogen, ammonia, and TOC appear to increase with increasing color concentrations and external inflows into the lake. A curvilinear relationship appears to exist between ammonia and color, while a linear relationship is apparent between color and TOC. The relationship between color and total nitrogen is less pronounced.

Inverse relationships were observed between color and TSI, chlorophyll-a, and Secchi disk depth, with increases in color resulting in decreases in measured values for each of these parameters. The relationship between chlorophyll-a and color appears to be a relatively well defined logarithmic type function, while more linear type relationships appear to exist between color and TSI and Secchi disk depth.

Based upon the relationships summarized in Figures 2-37 and 2-38, inflows from the wetland areas into Trout Lake appear to have a significant impact on the overall chemical characteristics of the lake, with increases in external inflows resulting in decreases in pH, dissolved oxygen, conductivity, alkalinity, chloride, TSI, chlorophyll-a, and Secchi disk depth, and decreases in color and external inflows associated with increases in turbidity, total nitrogen, ammonia, and TOC.

A graphical summary of mean monthly values for total nitrogen, total phosphorus, chlorophyll-a, and Secchi disk depth in Trout Lake from 1993-2015 is given on Figure 2-39. An evaluation of temporal relationships of significant trophic state indicator variables in lakes can often provide information on potential sources impacting water quality characteristics.

Measured mean monthly concentrations of total nitrogen in Trout Lake are relatively consistent throughout the year, with no apparent seasonal trend. In contrast, mean monthly total phosphorus values exhibit a strong seasonal trend, with the most elevated values observed during May and June. Concentrations increase gradually in the lake from January to April, reaching peak concentrations during May and June, followed by a gradual decrease in phosphorus concentrations during the remaining months of the year. Although it may appear that the elevated total phosphorus concentrations observed in May and June are due to runoff impacts, it should be noted that significant inputs to Trout Lake from the adjacent wetland areas do not begin to occur until late in the rainy season after all of the depressional storage areas within the watershed have become filled.

Mean monthly concentrations of chlorophyll-a appear to mimic the relationships observed for total phosphorus, suggesting a strong relationship between phosphorus and chlorophyll-a, although the observed elevated levels of total phosphorus in Trout Lake are much higher than concentrations which would cause nutrient limitation. Chlorophyll-a values appear to increase from January-May, with peak values observed during the months of June and July, followed by a gradual decrease throughout the remainder of the year. Measured Secchi disk depth values in Trout Lake are relatively consistent throughout the year, although slight peaks in Secchi disk depths appear to occur during periods of lower chlorophyll-a concentrations.

A graphical comparison of mean monthly TN/TP ratios and TSI values in Trout Lake from 1993-2015 is given on Figure 2-40. Both the calculated TN/TP ratios and TSI values exhibit strong seasonal trends. TN/TP ratios appear to decrease during summer conditions, with higher ratio values observed during other times of the year. However, the reductions in TN/TP ratios observed during summer months are more likely related to increases in phosphorus concentrations rather than decreases in the availability of nitrogen.

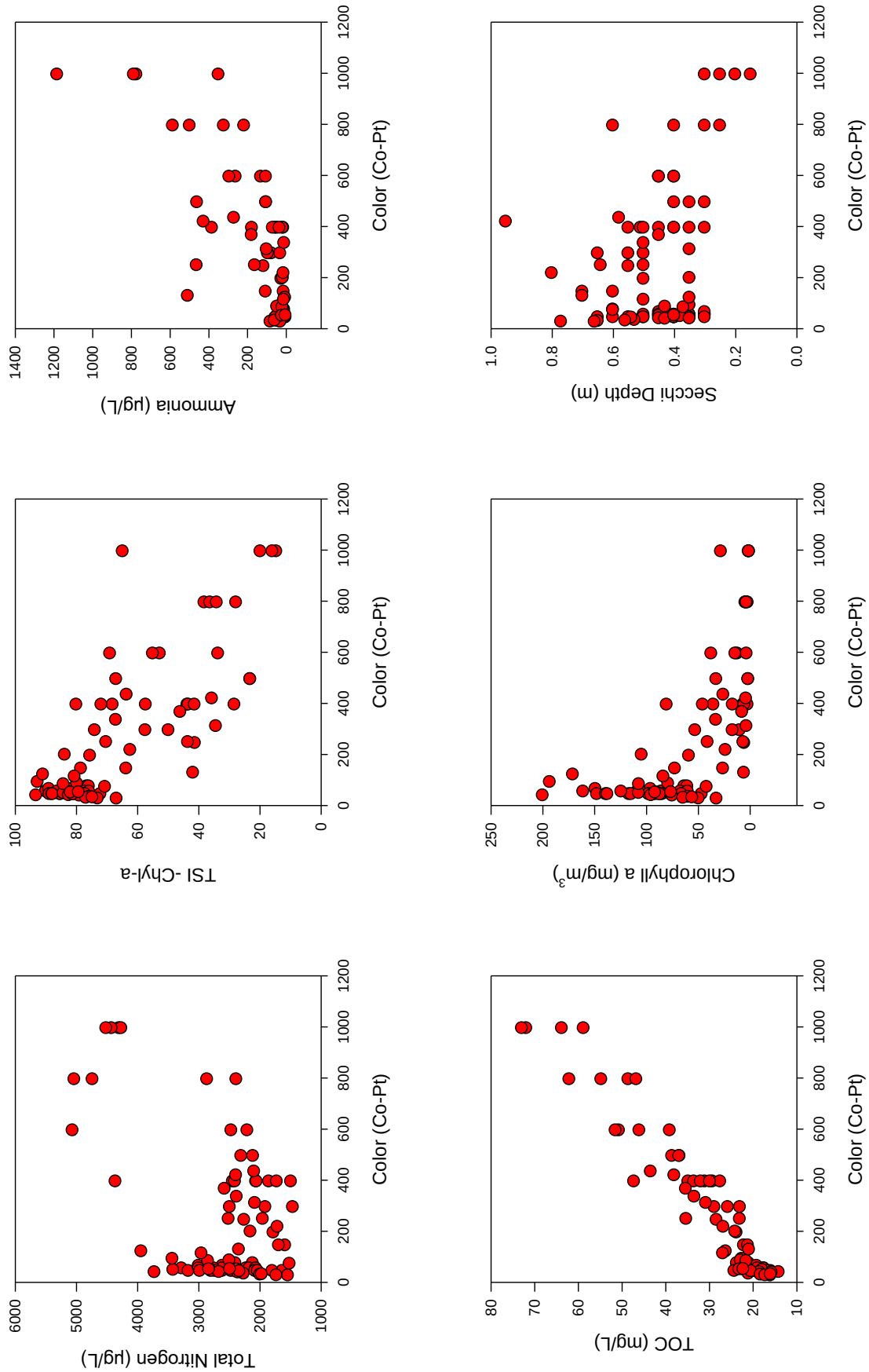


Figure 2-38. Relationships Between Color, Total Nitrogen, TSI, Ammonia, TOC, Chlorophyll-a, and Secchi Disk Depth in Trout Lake Based on the SJRWMD Data Set.

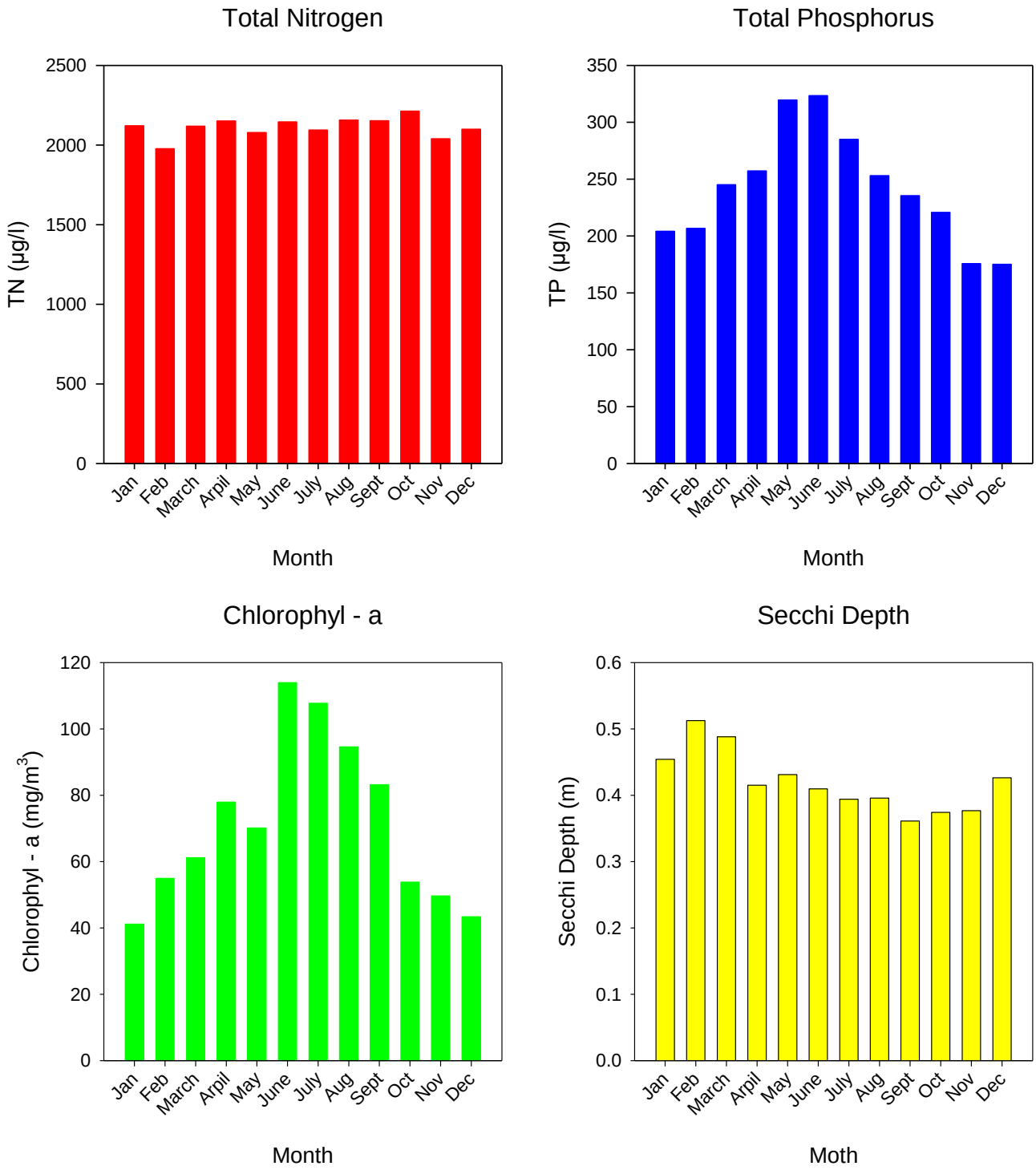


Figure 2-39. Mean Monthly Values for Total Nitrogen, Total Phosphorus, Chlorophyll-a, and Secchi Disk Depth in Trout Lake from 1993-2015.

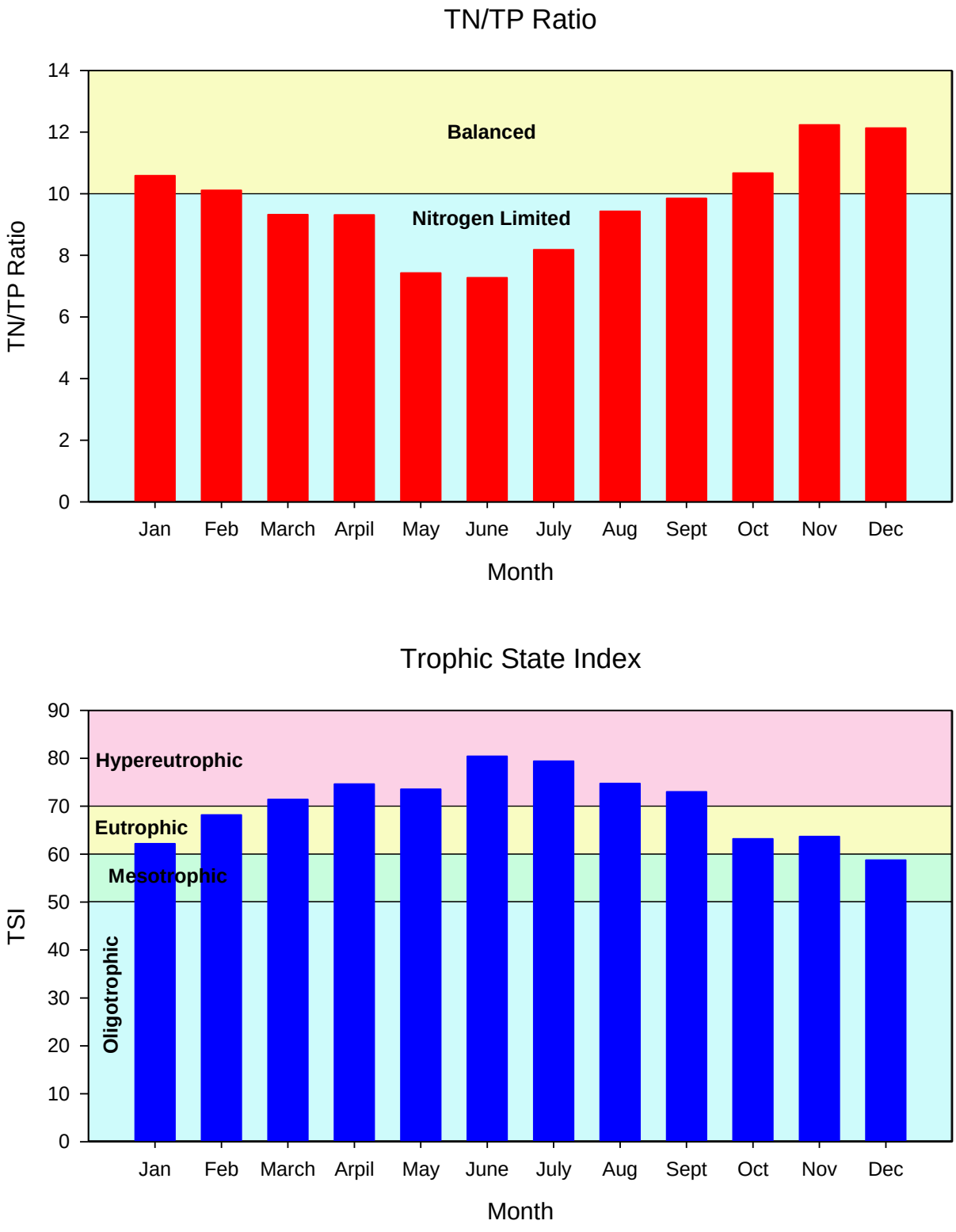


Figure 2-40. Mean Monthly TN/TP Ratios and TSI Values in Trout Lake from 1993-2015.

Monthly TSI values for Trout Lake from 1993-2015 have ranged from mesotrophic to hypereutrophic, with the highest TSI values observed during summer months. Overall, Trout Lake appears to exhibit hypereutrophic conditions from March-September, with eutrophic conditions observed during January, February, October, and November, and borderline mesotrophic-eutrophic characteristics during December.

2.3.2 Lake Yale

A summary of available historical water quality data for Lake Yale is given in Table 2-17. A significant amount of water quality monitoring has been conducted in Lake Yale by a variety of agencies, including LakeWatch, Lake County, and SJRWMD. Locations of the historical water quality monitoring sites in Lake Yale are illustrated on Figure 2-41.

The most significant historical data collection has been conducted by LakeWatch which provided analyses for surface water samples collected at a single monitoring site near the center of Lake Yale over the period from 1990-2016. Sample collection was conducted on three occasions during 1990, one occasion each during 1991 and 1992, two occasions during 1994, seven occasions during 1998, and monthly to bimonthly monitoring from 2000-2016, with a total of 210 separate samples collected as part of this effort. Each of the collected surface water samples was analyzed for the standard LakeWatch parameters of total nitrogen, total phosphorus, chlorophyll-a, and Secchi disk depth. Sporadic measurements of conductivity were also provided. Each of the LakeWatch samples was collected at a depth of 0.5 m.

Additional historical water quality monitoring has been conducted in Lake Yale by Lake County at four separate monitoring sites within the lake. Monitoring was conducted by Lake County beginning in 1982 at a site identified as “Lake Yale North Center”. The monitoring at this site was conducted from 1982-2004, excluding 2002, with 1-6 events collected at this site during each annual period. A total of 70 separate events were collected at this site, with samples measured for general parameters, nutrients, Secchi disk depth, and BOD. The data do not indicate the depth at which the samples were collected.

Monitoring was also conducted by Lake County at an additional site referred to as “Lake Yale Center”, with monitoring at this site conducted during 1992 and then from 2006-2016. Only one event was collected at this site during 1992, with monitoring from 2006-2010 conducted on a semi-annual or quarterly basis. Monitoring was increased to a monthly frequency during 2011-2016. A total of 73 separate samples has been collected at this site, and measured for general parameters, nutrients, Secchi disk depth, and BOD.

Monitoring was conducted by Lake County at a site identified as “Lake Yale South Center” from 1982-2016, with some data gaps. Six monitoring events were conducted during 1982, with three events conducted during 1983 and two events/year conducted from 1985-1987. No data appear to have been collected during 1984. From 1988-2000, monitoring was conducted at this site on a quarterly basis. One monitoring event was conducted during 2001, with three events during 2003, and one event during 2004. The next event wasn’t conducted until 2014 when quarterly monitoring was initiated at this site. Monitoring during 2015-2016 has been increased to a monthly frequency. A total of 84 separate samples has been collected at this site and measured for general parameters, nutrients, Secchi disk depth, and BOD. Field data were collected by Lake County from May-August 2001, with two events conducted at an additional site referred to as “Lake Yale Northwest” for measurements of temperature and Secchi disk depth only.

TABLE 2-17

SUMMARY OF AVAILABLE HISTORICAL WATER QUALITY DATA FOR LAKE YALE

AGENCY	STATION ID	COLLECTION PERIOD	MONITORING FREQUENCY	NUMBER OF EVENTS	DATA COLLECTED
LakeWatch	Yale	5/90-8/16	1990: 3 events 1991: 1 event 1992: 1 event 1994: 2 events 1998: 7 events 2000-2016: Monthly-Bimonthly	210	Total Nitrogen, Total Phosphorus, Chlorophyll-a, Secchi Depth, and Conductivity (sporadic)
Lake County	Lake Yale North Center	5/82-6/04	1982: 6 events 1983: 3 events 1984: 1 event 1985-1987: 2 events/year 1988-2000: Quarterly 2001: 1 event 2003: 3 events 2004: 1 event	70	General Parameters, Nutrients, Secchi Depth, and BOD
	Lake Yale Center	1/92-9/16	1992: 1 event 2006: 2 events 2007-2009: Quarterly 2010: 2 events 2011-2016: Monthly	73	General Parameters, Nutrients, Secchi Depth, and BOD
	Lake Yale Northwest	5/01-8/01	2 events	2	Temperature and Secchi Depth
	Lake Yale South Center	5/82-9/16	1982: 6 events 1983: 3 events 1985-1987: 2 events/year 1988-2000: Quarterly 2001: 1 event 2003: 3 events 2004: 1 event 2014: Quarterly 2015-2016: Monthly	84	General Parameters, Nutrients, Secchi Depth, and BOD
STORET (SJRWMD)	Lake Yale SE End	3/06-10/06	4 events	4	pH, Dissolved Oxygen, Nutrients, and Secchi Depth
	SJD-LL-1006	4/02-4/08	Quarterly	22	pH, Dissolved Oxygen, Nutrients, and Secchi Depth
	SJD-LL-1028	1/03-4/08	Quarterly	21	pH, Dissolved Oxygen, Nutrients, and Secchi Depth

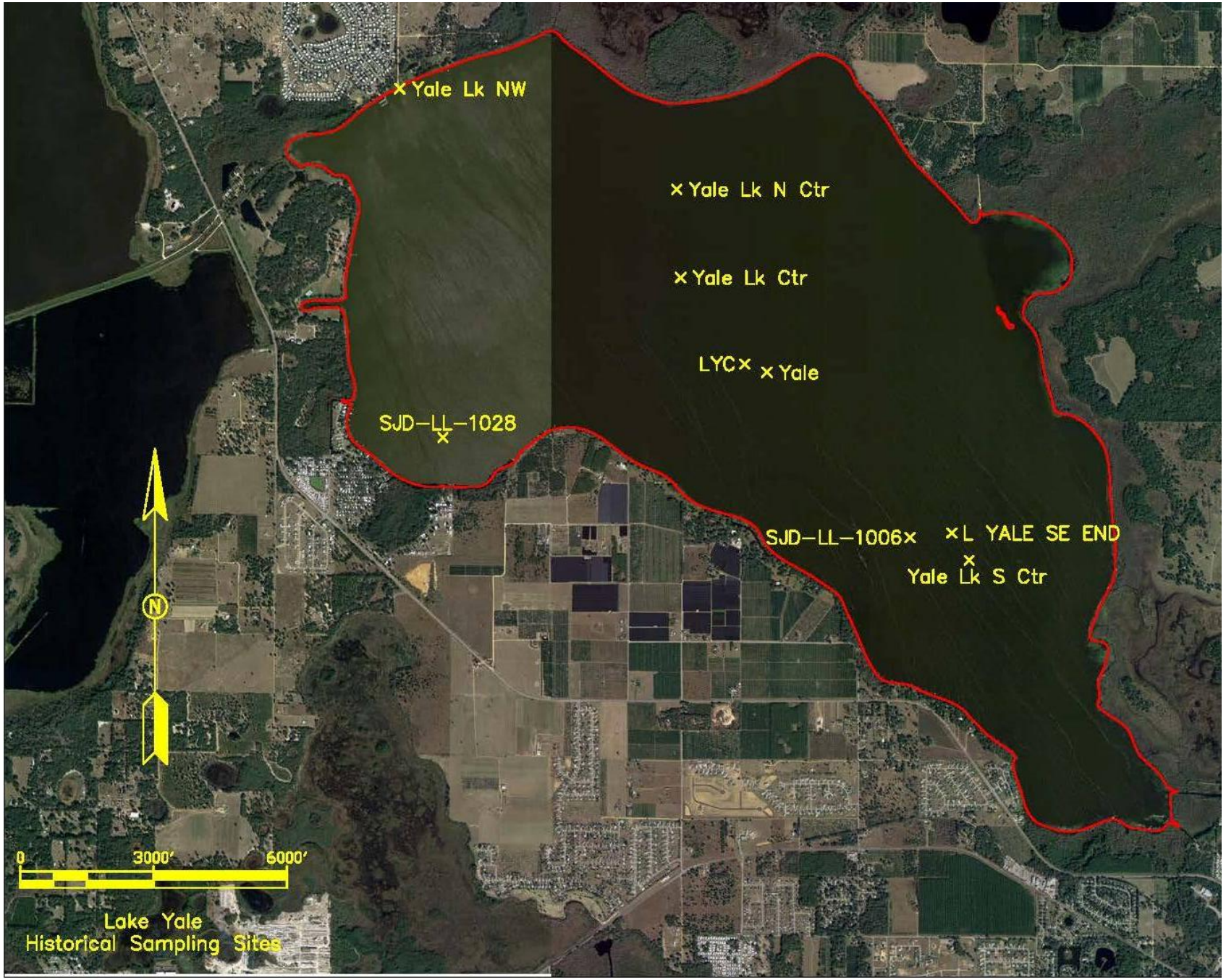


Figure 2-41. Historical Water Quality Monitoring Sites in Lake Yale.

The historical data review for Lake Yale also identified monitoring conducted by SJRWMD at three separate sites in Lake Yale. The site identified as “Lake Yale SE End” was monitored from March-October 2006, with 4 events conducted and measured for pH, dissolved oxygen, nutrients, and Secchi disk depth. An additional site, identified as “SJD-LL-1006”, was monitored from 2002-2008 on a quarterly basis, with 22 separate samples analyzed for the previously listed parameters. The final SJRWMD site, identified as “SJD-LL-1028”, was monitored on a quarterly basis from 2003-2008, with a total of 21 separate samples collected and analyzed for pH, dissolved oxygen, nutrients, and Secchi disk depth.

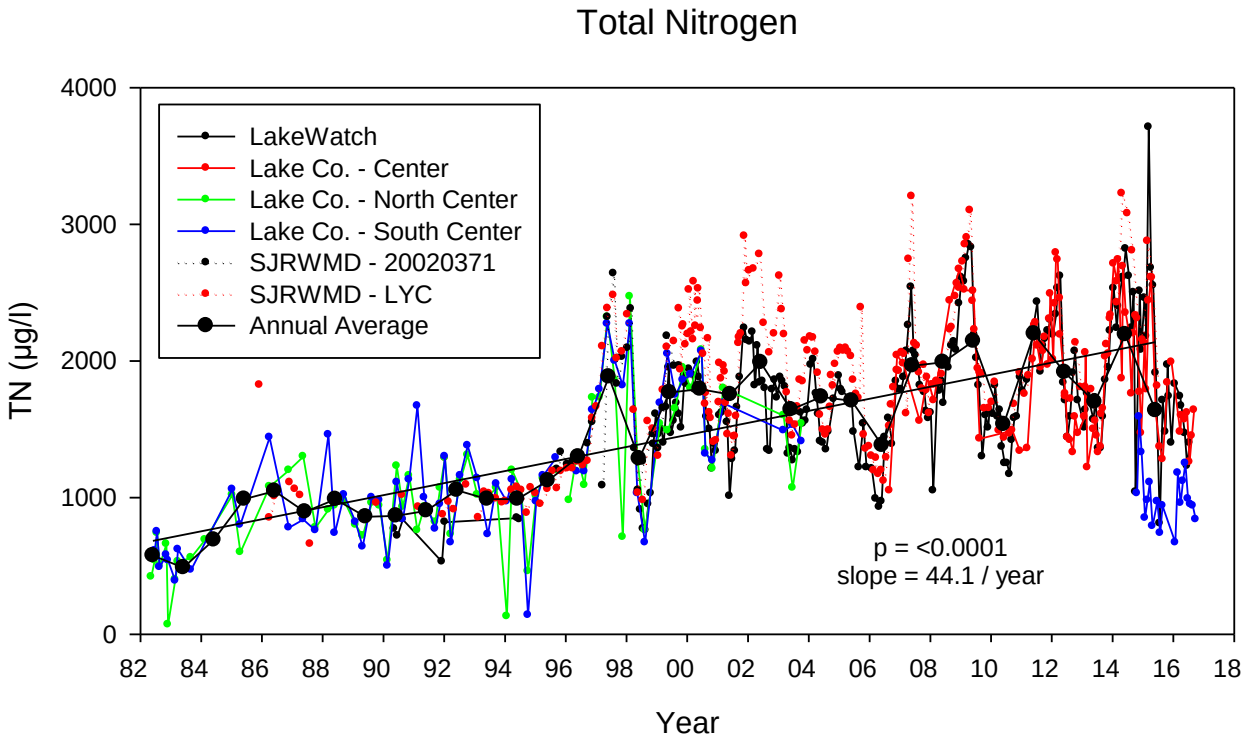
A historical data set for Lake Yale was developed by ERD using the available data collected by LakeWatch, Lake County, and SJRWMD. This data set includes significant trophic state variables such as total nitrogen, total phosphorus, chlorophyll-a, and Secchi disk depth, along with calculated TN/TP ratios and TSI values. The historical data set includes all of the available data collected by LakeWatch. The historical data set also includes all data collected at the Lake County station identified as “Lake Yale Center” from 1992-2016. The historical data set also includes all data collected at Lake County station “Lake Yale North Center” with the exception of the total phosphorus data. Total phosphorus data at this site are available from 1982-2004, but the data are listed in ten unit increments which reduces the usefulness of the data. In addition, the data set contains multiple values which appear to be either impossibly large or small, or are substantially different from other phosphorus values measured in Lake Yale and do not appear to correspond with chlorophyll-a measurements conducted during the same monitoring event.

Lake County data are also available from 1982-2016 at a site identified as “Lake Yale South Center”, and available data for significant trophic state parameters were included from these data. However, the phosphorus data were also excluded since the values are provided only in increments of 10 and multiple values occur which appear to be impossible or inconsistent with long-term phosphorus concentrations in Lake Yale, particularly for data beginning in 2014 where the reported phosphorus concentrations appear to be at least an order of magnitude greater than concentrations reported by other agencies.

A large amount of historical water quality data has also been collected in Lake Yale by SJRWMD, with monitoring conducted at two sites identified as “Station 20020371” and “SJRWMD-LYC”. All data, including phosphorus data, collected at Station 20020371 were included in the historical database. Some of the phosphorus data reported at Site SJRWMD-LYC are also questionable, particularly for samples collected from 2000 to the present. Phosphorus values collected during this period are highly variable, with multiple values that either appear to be impossible or do not correlate with monitored chlorophyll-a concentrations during the same monitoring event. Therefore, phosphorus data collected after 2000 at site SJRWMD-LYC are also excluded from the historical data set.

A combined historical data set was generated based upon the data described previously. This data set contains a total of 716 separate data entries, with 671 individual entries for total nitrogen, 393 entries for total phosphorus, 687 entries for chlorophyll-a, 309 entries for color, and 697 entries for Secchi disk depth.

Historical water quality characteristics in Lake Yale were evaluated by ERD based upon an examination of results from individual monitoring events as well as mean annual concentrations of total nitrogen, total phosphorus, chlorophyll-a, Secchi disk depth, TN/TP ratio, and TSI for the combined historical data set. A summary of historical trends in total nitrogen and total phosphorus in Lake Yale from 1982-2016 is given in Figure 2-42. Mean annual average values for total nitrogen and total phosphorus are superimposed over the historical data, and a trend line is provided to assist in identifying significant water quality trends. The nitrogen data consist of all measured total nitrogen concentrations contained in the data sets generated by LakeWatch, Lake County, and SJRWMD. The total phosphorus data include measurements collected by LakeWatch and SJRWMD at the “LYC” station.



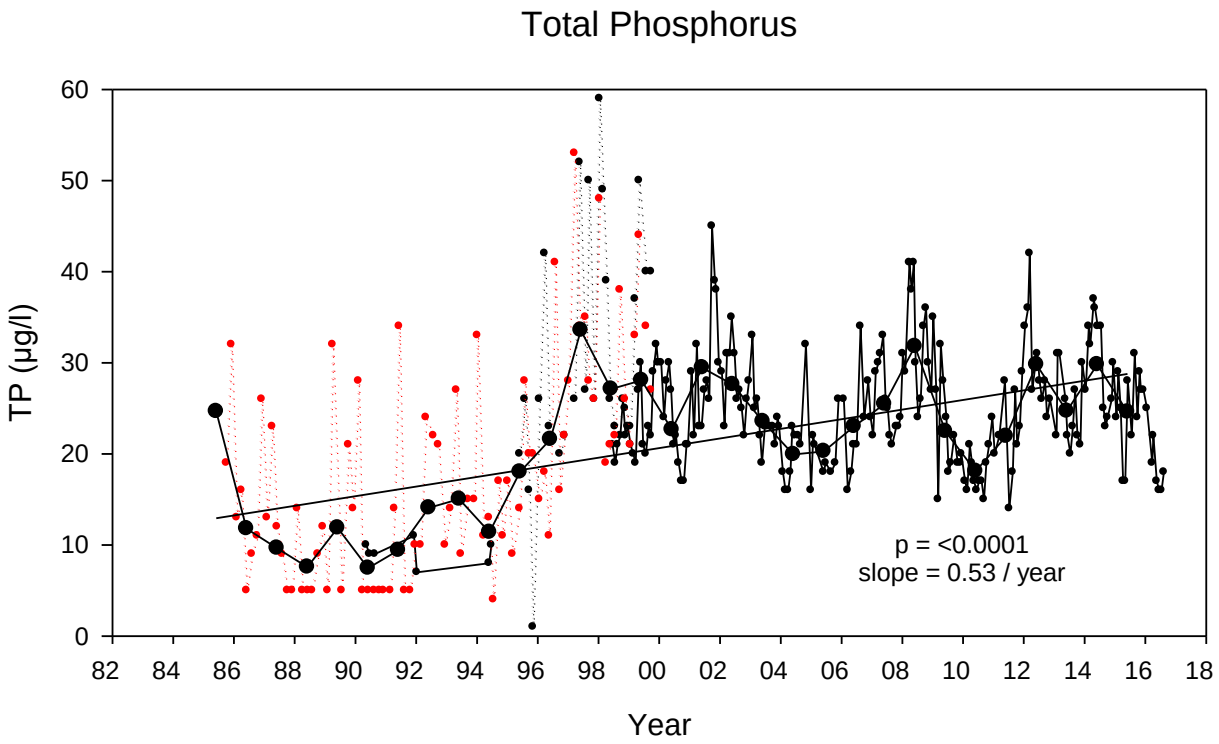


Figure 2-42. Trends in Total Nitrogen and Total Phosphorus in Lake Yale from 1982-2016.

Measured total nitrogen concentrations in Lake Yale have ranged from 100-3,800 μg/l, with the majority of measured values ranging from approximately 500-3,000 μg/l. Total nitrogen concentrations have exhibited a moderate degree of variability over time in Lake Yale, with a relatively close agreement between nitrogen concentrations measured by the various agencies. A general trend of increasing nitrogen concentrations is apparent in Lake Yale over the period of record, and based upon the calculated p value of <0.0001, this trend is statistically significant. A jump in total nitrogen concentrations appears to have occurred in Lake Yale during the period from 1996-1998, with measured values before this period ranging from approximately 500-1,200 μg/l and nitrogen concentrations following this period ranging from approximately 1,200-3,000 μg/l.

Measured total phosphorus concentrations in Lake Yale have been highly variable over time, with measured values ranging from less than 5 μg/l to more than 50 μg/l, although the majority of measured values appear to be in the range of 5-35 μg/l. The total phosphorus data summarized in Figure 2-42 include only the LakeWatch and SJRWMD "LYC" station data. A general trend of increasing phosphorus concentrations has occurred in Lake Yale over time, and based upon the calculated p value of <0.0001, this trend is statistically significant. A jump in phosphorus concentrations also occurred in Lake Yale from 1996-1998, similar to the trend observed for total nitrogen. Prior to 1996, the majority of total phosphorus concentrations ranged from approximately 5-25 μg/l. After 1998, phosphorus concentrations ranged from 20 μg/l to approximately 40 μg/l during most events.

The plots of historical concentrations of total nitrogen and total phosphorus in Lake Yale indicate a sudden rapid increase in water column concentrations of both total phosphorus and total nitrogen during the mid-1990s. This relatively rapid spike in nutrient concentrations appears to coincide with the introduction of a large number of grass carp into Lake Yale, beginning in 1987 and continuing to 1994, along with repetitive herbicide applications for control of Hydrilla. The nutrients released from the decomposition of vegetation, combined with excretions of plant material by the grass carp, resulted in an increase in water column nutrient concentrations, beginning in approximately 1994. Peak concentrations for total nitrogen and total phosphorus were reached during 1998, with relatively consistent water column concentrations of both total phosphorus and total nitrogen since that time.

A summary of historical trends in measured concentrations of chlorophyll-a and Secchi disk depth in Lake Yale from 1982-2016 is given on Figure 2-43. Measured chlorophyll-a values in Lake Yale have been highly variable over the available period of record, ranging from <1 mg/m^3 to more than 120 mg/m^3, although the vast majority of measurements appear to be between 5-60 mg/m^3. The calculated trend line for the annual average chlorophyll-a concentrations has a positive slope which indicates an increasing trend of chlorophyll-a concentrations over time, and the calculated p value of 0.0005 for this relationship indicates that the trend is statistically significant.

Measured Secchi disk depths in Lake Yale have also been highly variable over time, ranging from approximately 0.4-4.3 m. Prior to 1996, measured Secchi disk depths in Lake Yale generally exceeded 1 m during virtually all of the monitoring events. However, after 1998, the majority of measured Secchi disk depths were less than 1 m, although isolated values in excess of 1 m were observed on occasion. The trend line for the average annual Secchi disk depths indicates a negative slope, suggesting that Secchi disk depths are decreasing in Lake Yale over time, and the calculated p value of <0.0001 suggests that the trend is highly significant.

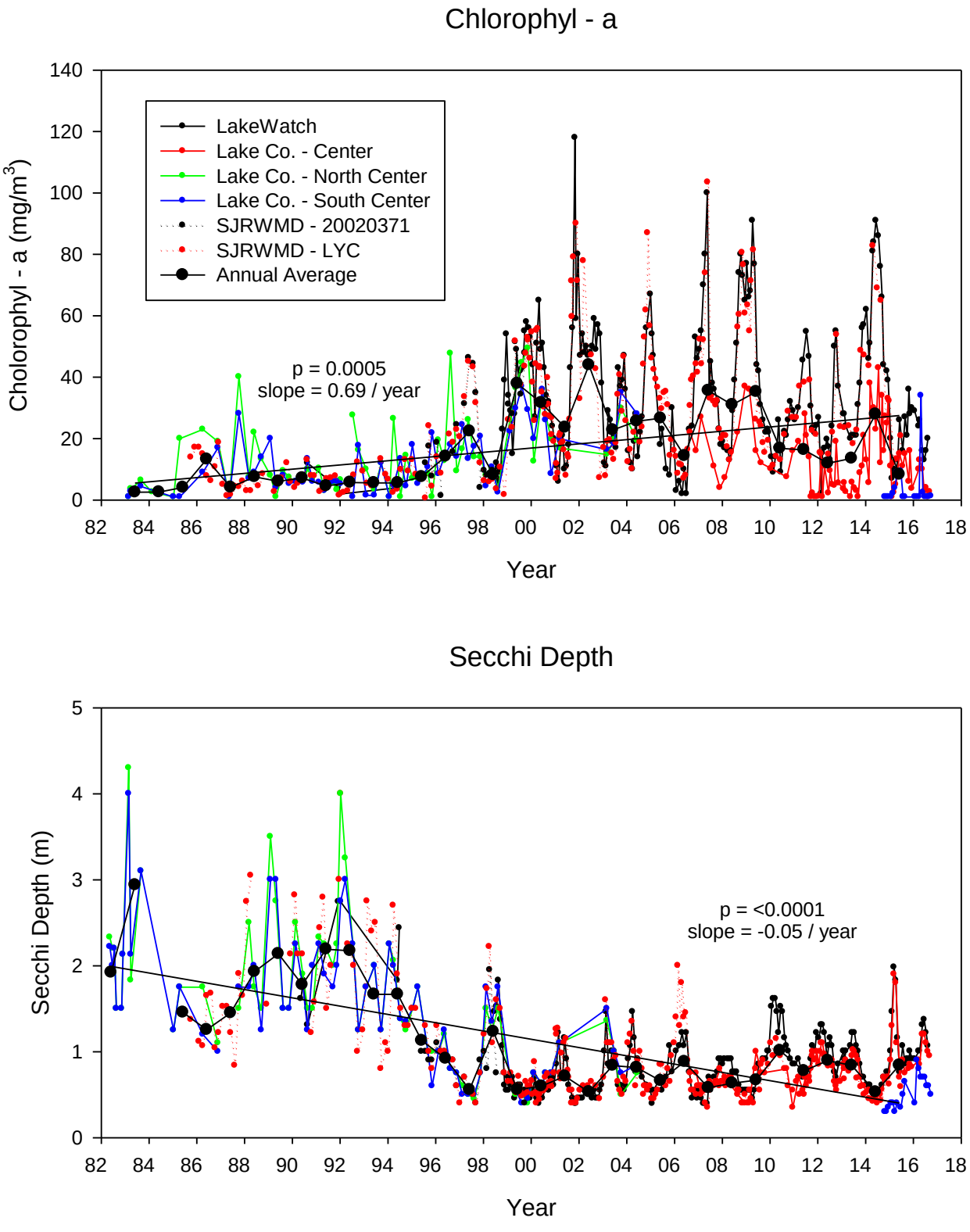


Figure 2-43. Trends in Chlorophyll-a and Secchi Disk Depth in Lake Yale from 1982-2016.

The observed trends of increases in chlorophyll-a and decreases in Secchi disk depth, beginning in approximately 1994, appear to closely follow the pattern of increasing nutrient concentrations shown on Figure 2-42. As chlorophyll-a concentrations increased during the mid- to late-1990s, Lake Yale was converted from a clear, non-turbid oligotrophic lake system to a plankton-dominated, turbid, eutrophic waterbody. The low visibility caused by the elevated algal growth reduces light penetration and limits the ability for submerged vegetation to grow within the lake which provides a continuing feedback mechanism that maintains the altered high nutrient status of Lake Yale.

A summary of trends in annual TN/TP ratios in Lake Yale from 1982-2016 is given on Figure 2-44. The TN/TP ratio data suggest that Lake Yale has existed in a phosphorus-limited condition throughout virtually all of the historical monitoring period. The calculated trend line for changes in TN/TP ratios over time has a positive slope which suggests an increase in TN/TP ratios over time. However, the calculated p value of 0.8754 indicates that the trend is not statistically significant.

Trends in TSI values in Lake Yale from 1982-2016 are also summarized on Figure 2-44. Over the available period of record, Lake Yale has fluctuated from oligotrophic to hypereutrophic conditions based upon measurements of chlorophyll-a. The trend line through the annual average TSI values indicates an increasing trend of TSI in Lake Yale over time, and the calculated p value of <0.0001 indicates that the trend is highly significant.

A tabular summary of annual geometric mean values for significant trophic state variables in Lake Yale from 1982-2015 is given on Table 2-18. The values summarized in this table are based upon the combined historical data set from all available sources with the exception of the excluded total phosphorus data discussed previously.

Annual geometric mean total nitrogen concentrations in Lake Yale have ranged from 488-2,198 μg/l based upon the historical data set. Total nitrogen concentrations in upper portions of this range are somewhat elevated compared with nitrogen concentrations commonly observed in Central Florida lakes.

Mean annual geometric mean concentrations of total phosphorus in Lake Yale have ranged from 7-37 μg/l, reflecting moderate to slightly elevated values for a Central Florida lake. Measured concentrations of chlorophyll-a in Lake Yale have been highly variable over time, with annual geometric mean values ranging from 2.6-44.0 mg/m^3.

Mean annual color values in Lake Yale have ranged from 10-123 Pt-Co units. A gradual trend of increasing color values in Lake Yale is apparent over time, with color values measured from 2010-2015 four to ten times higher than values measured prior to 1990. Measured Secchi disk depths in Lake Yale have ranged from good to poor, with mean annual values ranging from 0.53-2.94 m, and a significant trend of decreasing Secchi disk depth over time.

A graphical comparison of mean monthly concentrations of total nitrogen, total phosphorus, chlorophyll-a, and Secchi disk depth in Lake Yale from 1982-2015 is given on Figure 2-45. An evaluation of temporal trends in trophic state indicators can often be useful in identifying significant processes which impact water quality. Measured concentrations of total nitrogen appear to be relatively consistent throughout the year, with a slight trend of decreasing nitrogen concentrations during the period from May-September which is generally considered to be wet season conditions. Decreases in concentrations of a given parameter during wet season conditions suggests that runoff generated loadings may not be the most significant source of nitrogen to Lake Yale.

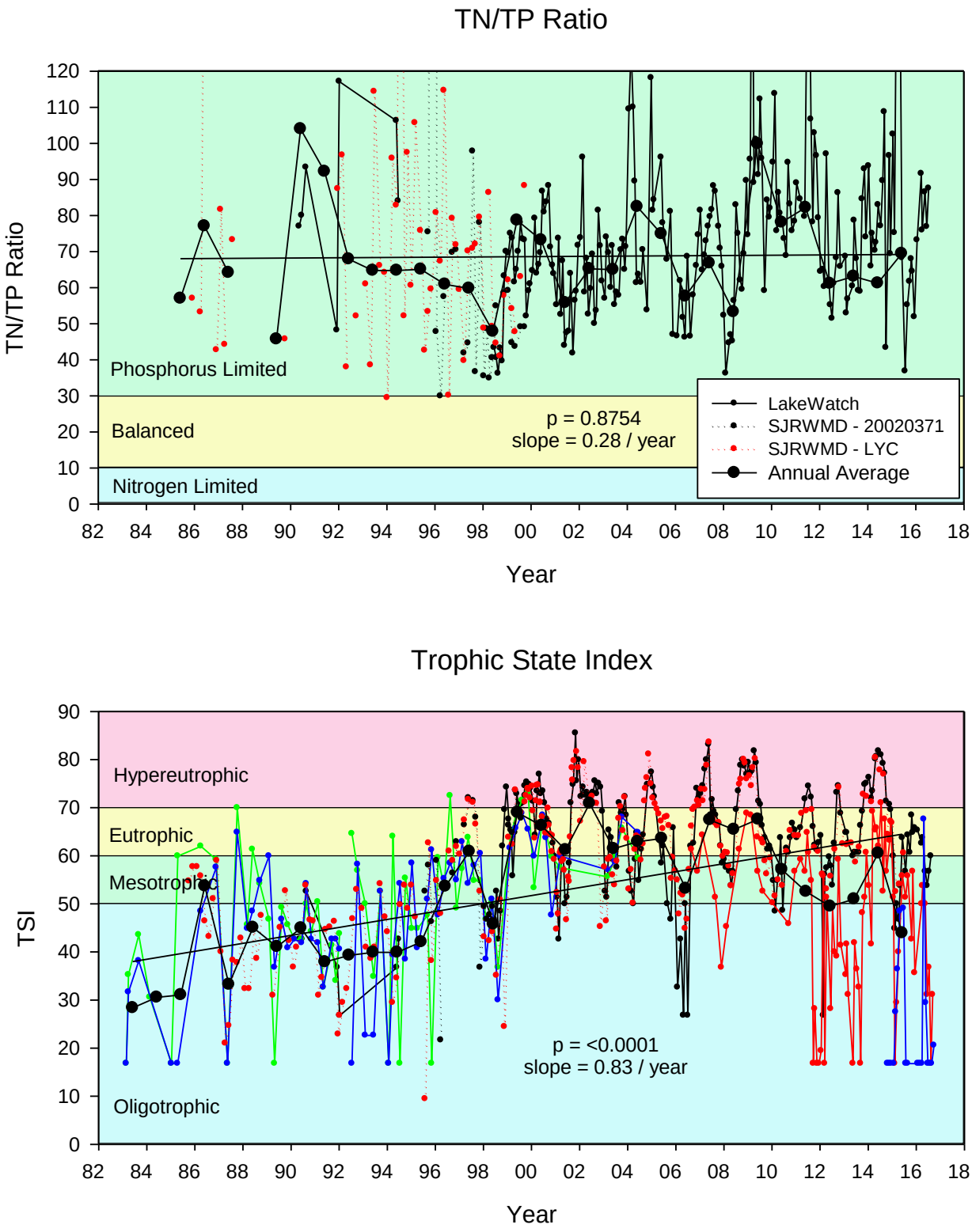


Figure 2-44. Trends in TN/TP Ratios and TSI Values in Lake Yale from 1982-2016.

TABLE 2-18

ANNUAL GEOMETRIC MEAN VALUES FOR SIGNIFICANT TROPHIC STATE VARIABLES IN LAKE YALE FROM 1982-2015

DATE	PARAMETER						
	Total Nitrogen (µg/l)	Total Phosphorus (µg/l)	Chlorophyll-a (mg/m^3)	Color (Pt-Co)	Secchi Disk Depth (m)	TN/TP Ratio	TSI (Chlorophyll-a)
1982	576	--	--	--	1.92	--	--
1983	488	--	2.6	--	2.94	--	28
1984	690	--	2.6	--	--	--	31
1985	989	25	4.1	15	1.46	57	31
1986	1,048	12	13.3	11	1.26	77	54
1987	895	10	4.1	16	1.45	64	33
1988	987	8	7.6	22	1.93	--	45
1989	860	12	6.1	13	2.14	46	41
1990	866	7	7.2	10	1.78	104	45
1991	903	9	4.6	11	2.19	92	38
1992	1,054	15	5.7	10	2.17	68	39
1993	988	15	5.6	12	1.67	65	40
1994	988	15	5.6	12	1.67	65	40
1995	1,123	18	7.5	29	1.13	65	42
1996	1,298	22	14.2	16	0.92	61	54
1997	1,883	34	22.4	18	0.56	60	61
1998	1,285	27	8.2	25	1.23	48	46
1999	1,769	23	37.9	16	0.56	79	69
2000	1,794	23	31.7	14	0.60	73	66
2001	1,754	29	23.7	15	0.71	56	61
2002	1,988	28	44.0	21	0.53	65	71
2003	1,643	24	22.8	24	0.84	65	61
2004	1,736	20	25.7	23	0.82	82	63
2005	1,707	20	26.6	28	0.66	75	64
2006	1,381	23	14.4	15	0.88	58	53
2007	1,964	29	35.6	28	0.58	67	67
2008	1,990	36	31.0	36	0.63	53	65
2009	2,144	21	35.3	58	0.67	100	68
2010	1,535	19	16.8	58	1.01	78	57
2011	2,198	27	16.4	88	0.78	82	53
2012	1,917	31	11.9	98	0.90	61	49
2013	1,700	26	13.6	61	0.84	63	51
2014	2,192	37	27.9	123	0.53	61	61
2015	1,637	28	8.3	64	0.84	69	44
Mean	**1,411**	**22**	**16.5**	**32**	**1.18**	**69**	**51**

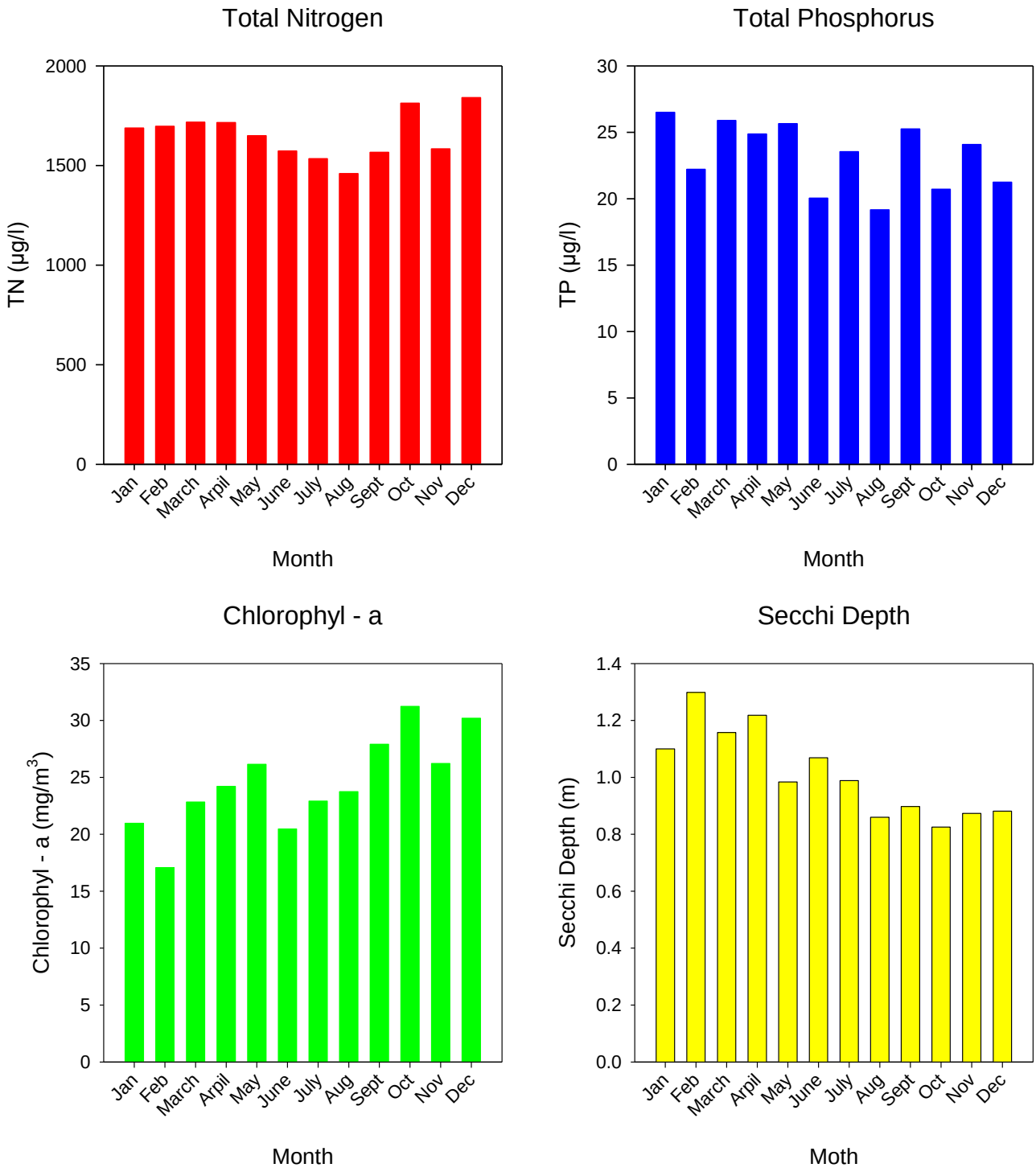


Figure 2-45. Mean Monthly Concentrations of Total Nitrogen, Total Phosphorus, Chlorophyll-a, and Secchi Disk Depth in Lake Yale from 1982-2015.

Measured concentrations of total phosphorus exhibit a moderate degree of variability between the individual monthly measurements, with the lowest phosphorus concentrations in Lake Yale observed during the months of June, August, October, and December. The observed monthly patterns for phosphorus concentrations illustrated on Figure 2-45 do not provide a clear insight on potential phosphorus sources to Lake Yale.

A strong seasonal trend is apparent for chlorophyll-a, with the lowest chlorophyll-a values measured during the months of January, February, June, July, and August, and the highest concentrations measured during fall and early-winter. Measured Secchi disk depths appear to observe a pattern opposite of chlorophyll-a where the highest measured Secchi disk depths generally correspond with the periods of lowest concentrations for chlorophyll-a.

A graphical comparison of mean monthly TN/TP ratios and TSI values in Lake Yale from 1982-2015 is given on Figure 2-46. Measured TN/TP ratios appear to be relatively consistent throughout the year, with the most elevated values observed during February, June, July, and August. Measured TSI values also appear to be relatively consistent in Lake Yale, with mesotrophic conditions observed within the lake during each of the monthly periods except October and December where the highest annual TSI values have been observed.

In addition to the trophic state indicators discussed previously, monitoring conducted by Lake County and SJRWMD in Lake Yale also included a number of general lake parameters. A tabular summary of mean annual characteristics for general parameters measured in Lake Yale is given in Table 2-19 and includes measured data for pH, dissolved oxygen, conductivity, alkalinity, TSS, turbidity, BOD, TOC, and chloride. Annual mean values are provided for these parameters over the period from 1985-2015, with an overall mean value for the entire data set.

Measured pH values in Lake Yale have been slightly alkaline throughout the entire period of record, with mean annual values ranging from 7.64-8.73, and an overall mean pH value of 8.13. Measured concentrations of dissolved oxygen in Lake Yale have generally exceeded 5 mg/l on an average annual basis, with the exceptions of measurements collected during 2000, 2001, and 2002 where mean annual dissolved oxygen concentrations ranged from 1.1-1.9 mg/l. Dissolved oxygen values in this range reflect extremely low values, particularly for annual averages, and a significant oxygen-consuming event or series of events would be required to reduce whole-lake oxygen concentrations into this range for an extended period.

Measured conductivity values in Lake Yale are similar to values measured in other Central Florida Lakes, with mean annual values ranging from 302-424 μmho/cm. Lake Yale is well buffered, with mean annual alkalinity values ranging from 72-126 mg/l. Measured values for both TSS and turbidity have exhibited a moderate degree of variability, ranging from low to moderate in value. Measured BOD concentrations in Lake Yale have also been low in value, with annual mean values ranging from 1.0-2.8 mg/l.

Measured TOC values in Lake Yale have been low to moderate in value, with a general trend of increasing TOC concentrations over time. Chloride values have also been moderate in Lake Yale, with a general trend of increasing values for this parameter over time similar to the trend observed for TOC.

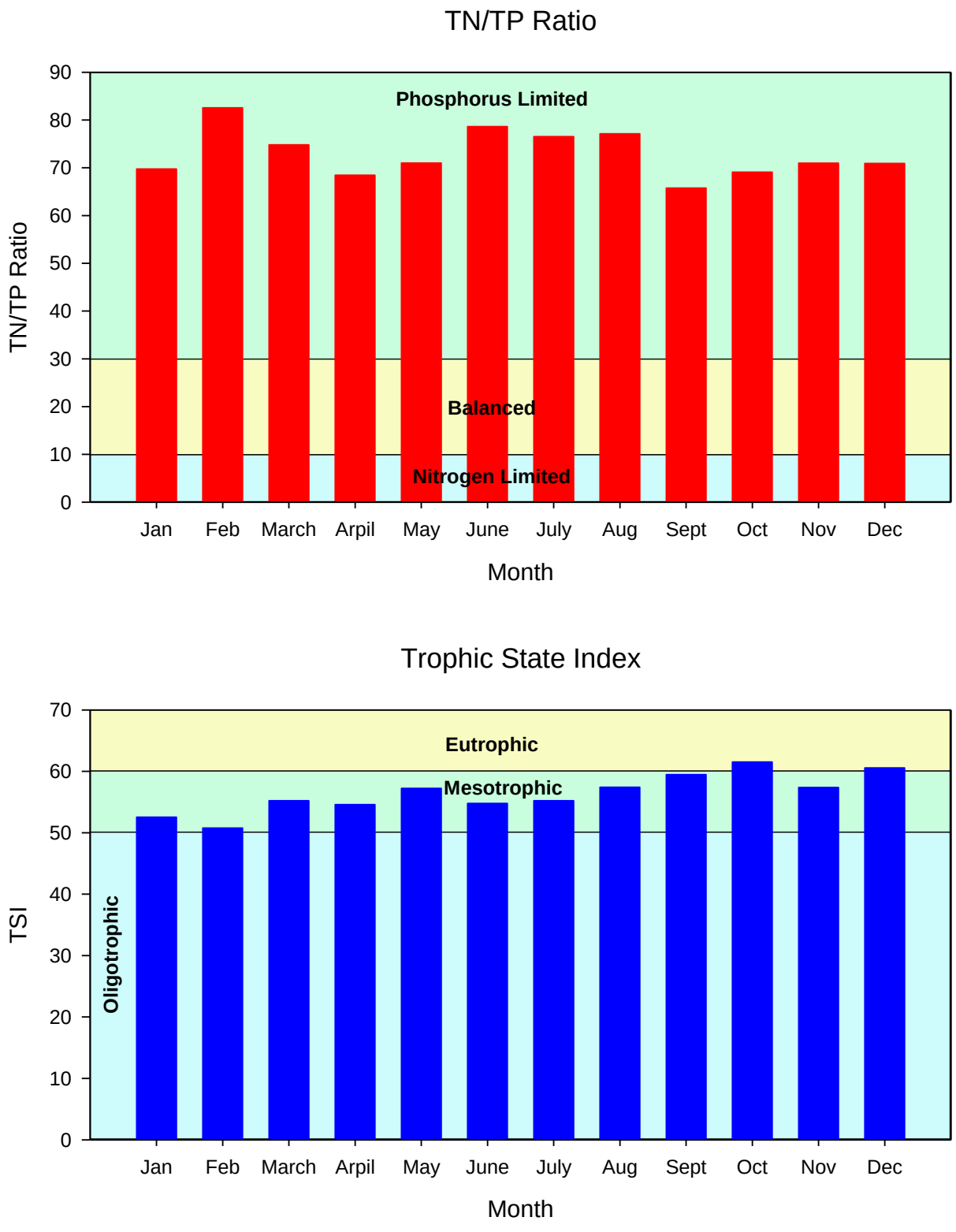


Figure 2-46. Mean Monthly TN/TP Ratios and TSI Values in Lake Yale from 1982-2015.

TABLE 2-19

MEAN ANNUAL CHARACTERISTICS OF GENERAL PARAMETERS MEASURED IN LAKE YALE BY LAKE COUNTY AND SJRWMD FROM 1985-2015

DATE	PARAMETER								
	pH (s.u.)	Dissolved Oxygen (mg/l)	Conductivity (μmho/cm)	Alkalinity (mg/l)	TSS (mg/l)	Turbidity (NTU)	BOD (mg/l)	TOC (mg/l)	Chloride (mg/l)
1985	8.29	8.7	312	124	8.4	2.6	1.8	--	30.5
1986	8.52	8.5	303	117	5.1	4.0	2.4	--	29.1
1987	7.64	9.2	319	113	3.7	3.3	1.4	11.1	30.0
1988	8.35	8.6	304	106	3.2	1.6	1.3	10.5	31.1
1989	8.18	8.7	316	72	3.0	1.5	1.6	12.2	33.0
1990	8.19	8.4	335	78	4.0	2.0	1.2	11.0	37.6
1991	8.25	8.7	312	101	7.1	2.0	1.3	11.1	28.6
1992	8.23	8.6	322	107	3.4	2.5	1.1	9.2	28.4
1993	8.02	7.9	341	119	6.6	2.3	1.0	11.4	31.4
1994	8.19	8.7	346	122	5.2	2.3	1.0	11.1	34.8
1995	8.08	8.2	329	113	5.7	3.5	1.7	10.9	32.8
1996	8.08	8.5	324	119	6.8	4.5	--	10.0	33.5
1997	8.16	7.2	359	121	15.2	6.2	--	18.4	36.6
1998	7.90	7.5	319	106	6.4	3.3	--	11.7	34.4
1999	8.34	5.4	348	112	11.6	7.8	--	16.9	34.4
2000	7.89	1.5	351	124	9.4	7.6	--	17.5	38.6
2001	7.77	1.9	368	123	9.2	7.1	--	17.0	42.3
2002	7.16	1.1	370	120	11.1	11.1	--	21.0	40.0
2003	8.12	4.6	330	114	9.5	4.8	--	19.3	36.4
2004	7.96	6.7	302	110	11.1	5.4	--	19.1	34.6
2005	7.83	5.4	307	97.9	6.6	8.5	--	18.7	30.9
2006	8.18	6.7	305	100	9.5	6.0	2.3	16.4	31.7
2007	8.50	6.8	350	110	15.2	10.5	2.8	20.2	37.8
2008	8.36	7.3	352	107	18.4	8.3	--	22.7	39.2
2009	7.85	5.0	354	111	8.9	11.7	--	22.5	37.3
2010	8.11	6.8	344	111	10.4	5.3	--	19.5	35.0
2011	8.13	6.8	387	118	8.8	7.5	--	20.9	41.1
2012	8.73	9.3	405	120	10.9	--	--	19.2	47.0
2013	8.55	8.5	424	126	11.4	--	--	18.1	52.2
2014	8.37	8.4	398	106	14.5	--	--	20.0	51.8
2015	8.15	8	405	104	8.0	--	--	19.9	46.5
Mean	**8.13**	**7.0**	**343**	**111**	**8.7**	**5.3**	**1.6**	**16.1**	**36.4**

2.4 Current Water Quality Characteristics

2.4.1 General Monitoring Activities

A monthly surface water quality monitoring program was conducted in Trout Lake and Lake Yale by ERD from March 2015-March 2016 at fixed monitoring locations within each lake. Locations of surface water monitoring sites in Trout Lake are illustrated on Figure 2-47. Site 1 is located west of the center of Trout Lake, with Site 2 located adjacent to the area of wetland inflows. Water quality monitoring in Trout Lake was conducted on a monthly basis, with a total of 12 monitoring events conducted at each of the two monitoring sites during the 12-month field monitoring program.



Figure 2-47. Surface Water Monitoring Sites in Trout Lake Used by ERD.

Locations of surface water monitoring sites in Lake Yale are illustrated on Figure 2-48. Five separate monitoring sites were established in Lake Yale to evaluate horizontal variability within the lake and potential water quality impacts from the large agricultural area on the south shoreline of the lake and the large wetland areas located on the east side of the lake. The original scope of services for this project specified four monitoring sites in Lake Yale, but a fifth site was added inside the small cove on the west side of Lake Yale due to the visually different water quality characteristics observed in this area during the initial event. Water quality monitoring in Lake Yale was conducted on a monthly basis, with a total of 12 monitoring events conducted at each of the original four sites and 11 events conducted at Site 5 during the 12-month monitoring program.



Figure 2-48. Surface Water Monitoring Sites in Lake Yale Used by ERD.

Sample collection procedures followed methods outlined in DEP-SOP-001/01 titled "Department of Environmental Protection Standard Operating Procedures for Field Activities" dated March 31, 2008. Surface water samples were collected using a battery-powered peristaltic pump constructed of plastic and stainless steel. Two separate samples were collected at each site during each monitoring event. The first sample was collected at a depth equal to 50% of the Secchi disk depth at the time of sample collection. The second sample was collected at a depth of 0.5 m above the sediment/water interface. Each of the collected samples was preserved as appropriate for the parameter to be analyzed, stored in wet ice, and returned to the ERD Laboratory for chemical analyses. A listing of laboratory measurements performed on the collected samples is given in Table 2-20, along with a summary of analytical methods and laboratory detection limits.

During each monitoring event, vertical profiles of pH, temperature, conductivity, dissolved oxygen, oxidation reduction potential (ORP), and turbidity were conducted at each site. Field measurements were collected at water depths of 0.25 m and at 0.5 m, and at 0.5 m intervals to the bottom at each site. All field measurements were performed using Hydrolab Data Sonde H2O and Data Sonde 4a units. A measurement of Secchi disk depth was also performed at each site.

TABLE 2-20

ANALYTICAL METHODS AND DETECTION LIMITS FOR LABORATORY ANALYSES CONDUCTED BY ENVIRONMENTAL RESEARCH AND DESIGN, INC.

MEASUREMENT PARAMETER		METHOD	METHOD DETECTION LIMITS (MDLs)[1]
General Parameters	Hydrogen Ion (pH)	SM-21[2], Sec. 4500-H^+ B	N/A
	Alkalinity	SM-21, Sec. 2320 B	0.7 mg/l
	TSS	SM-21, Sec. 2540 D	0.7 mg/l
	Color	SM-21, Sec. 2120 C	0.9 Pt-Co Unit
	Specific Conductivity	SM-21, Sec. 2510 B	2 μmho/cm
	Turbidity	SM-21, Sec. 2130 B	0.4 NTU
Nutrients	Ammonia-N (NH_3-N)	SM-21, Sec. 4500-NH_3 G	10 μg/l
	Nitrate + Nitrite (NO_x-N)	SM-21, Sec. 4500-NO_3 F	10 μg/l
	Total Nitrogen	SM-21, Sec. 4500-N C	25 μg/l
	Orthophosphorus	SM-21, Sec. 4500-P F	2 μg/l
	Total Phosphorus	SM-21, Sec. 4500-P B.5	3 μg/l
Biological Parameters	Chlorophyll-a	SM-21, Sec. 10200 H.1.3	1 mg/m^3

1. MDLs are calculated based on the EPA method of determining detection limits.
2. Standard Methods for the Examination of Water and Wastewater, 21st Ed., 2005.

2.4.2 Trout Lake

2.4.2.1 Field Measurements

A complete listing of field measurements collected by ERD during the 12-month monitoring period from March 2015-March 2016 is given in Appendix D-1. A graphical summary of vertical field profiles collected in Trout Lake at Site 1 during the field monitoring program is given in Figure 2-49. Vertical field profiles are provided for each of the 12 monthly monitoring events conducted at this site. Water depths at this site during the monitoring program ranged from 2.49-3.40 m.

Measured temperature profiles at Site 1 exhibited relatively isograde conditions during virtually all of the monthly monitoring events, with a slight trend of decreasing temperature with increasing water depth during most events. A relatively rapid decrease in temperature was observed at this site at a depth of 1.5 m during the February 2016 monitoring event, although this is likely due to seasonal temperature variabilities rather than a biological induced condition.

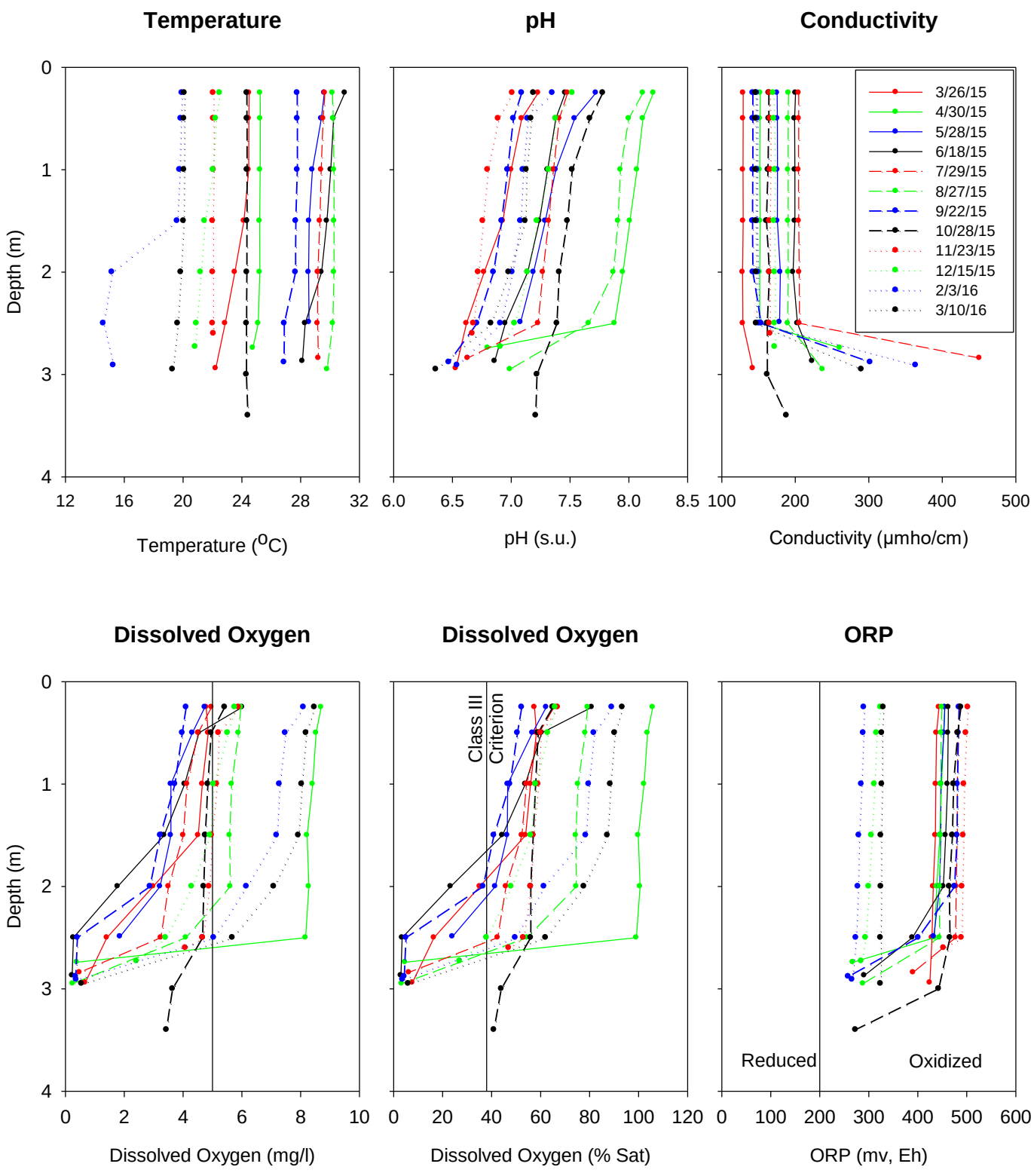


Figure 2-49. Vertical Field Profiles Collected at Site 1 in Trout Lake from March 2015-March 2016.

Measured surface pH values at Site 1 ranged from approximately 7-8.2 during the field monitoring program. A slight trend of decreasing pH with increasing water depth was observed during each of the monitoring events, with a more rapid decrease in pH observed near the water sediment interface during approximately half of the field monitoring events. Measured pH values at the water-sediment interface at Site 1 ranged from approximately 6.3-7.2, reflecting values commonly observed in eutrophic lakes in Central Florida.

Measured conductivity values at Site 1 were relatively low in value, with surface measurements ranging from approximately 120-200 μmho/cm. Virtually isograde conductivity profiles were observed during each of the monitoring events to a depth of approximately 2.5 m, near the water-sediment interface. Conductivity values below this depth began to increase rapidly with bottom measurements ranging from approximately 150-470 μmho/cm. The substantial increases in conductivity observed near the water-sediment interface are an indication of internal recycling of ions from the sediments into the overlying water column.

Measured dissolved oxygen concentrations in Trout Lake at Site 1 were highly variable during the field monitoring program, with surface measurements ranging from 4-9 mg/l. Dissolved oxygen concentrations decreased slowly with increasing water depth to approximately 2 m where oxygen concentrations began to decrease more rapidly during a majority of the monitoring events. Measured oxygen concentrations near the water-sediment interface ranged from near 0 mg/l to 3.5 mg/l. Until 2013, the dissolved oxygen criterion in Class III surface waters in the State of Florida was 5 mg/l, and this value is indicated on Figure 2-49. Based upon this historical criterion, only 5 of the 12 monitoring events would have met this criterion in the top 2 m of the water column, with violations of the 5 mg/l criterion observed during the remaining 7 monitoring events. Low dissolved oxygen concentrations appear to be a periodic issue in Trout Lake, although this is more likely related to the low dissolved oxygen concentrations in the wetland inflows which occur into the east end of the lake on a seasonal basis. The monitoring events with dissolved oxygen concentrations in excess of 5 mg/l occurred during the period from November 2015-March 2016 when wetland inflows and water temperatures would be minimal, both of which contribute to enhanced concentrations of dissolved oxygen.

Beginning in 2013, FDEP changed from a concentration-based criterion for dissolved oxygen to a criterion based upon oxygen saturation, with the criterion for lakes in the Peninsula portion of Florida set at an average of 38% oxygen saturation within the top 2 m of the water column. Based upon this revised criterion, dissolved oxygen concentrations during each of the 12 monitoring events appear to have met the 38% average saturation criterion within the top 2 m of the water column. Oxygen saturation values less than 38% were observed at approximately half of the monitoring sites at depths below 2 m and at all of the monitoring sites at the water-sediment interface.

Measured ORP values are also provided for the vertical profiles collected during each of the field monitoring events in Trout Lake. The ORP values are based upon a hydrogen electrode reference (E_h). Using this scale, ORP values less than 200 mv are considered to indicate reduced conditions, while values greater than 200 mv indicated oxidized conditions. Based upon these criteria, oxidized conditions were maintained within the water column of Trout Lake in spite of low dissolved oxygen concentrations measured near the water-sediment interface. However, even though oxidized conditions appear to have been maintained within the water column, it is virtually certain that reduced conditions occur rapidly upon entering the sediment layer.

A graphical summary of vertical field profiles collected in Trout Lake at Site 2 from March 2015-March 2016 is given on Figure 2-50. Water depths at this site ranged from 2.55-3.0 m during the field monitoring program. Overall, vertical field profiles collected at Site 2 are virtually identical to the profiles collected at Site 1. Relatively isograde temperature conditions were observed at Site 2 during each of the field monitoring events, with the exception of a slight decrease in temperature observed during the February 2016 monitoring event in deeper portions of the water column.

Measured surface pH values at Site 2 ranged from approximately 6.6-7.9, with a slight trend of decreasing pH with increasing water depth within the top 2 m. Below a depth of 2 m, a more rapid decrease in pH was observed, with bottom measurements ranging from 6.2-7.0.

Dissolved oxygen concentrations were highly variable during the field monitoring program, with surface measurements ranging from 4-8 mg/l. Oxygen concentrations decreased rapidly below a depth of 2 m, with concentrations near 0 mg/l at the water-sediment interface during 10 of the 12 monitoring events. Oxygen concentrations greater than 5 mg/l in the top 2 m were observed during 10 of the 12 events.

Oxygen saturation values greater than the Class III criterion of 38% were observed on an average basis in the top 2 m of the water column during 11 of the 12 monitoring events, with a lower than 38% average saturation value observed for the March 2015 monitoring event. Below a depth of 2 m, oxygen saturation decreases rapidly during each event, with saturation values near 0% at the water-sediment interface during 9 of the 12 monthly events.

Based upon measured values for redox potential, oxidized conditions were maintained in the top 2.5 m of the water column during each event conducted at Site 2. However, decreases in ORP were observed below this depth, with reduced conditions at the water-sediment interface observed during 4 of the 12 events. Although oxidized conditions may have been observed near the water-sediment interface, it is virtually certain that reduced conditions occur relatively quickly upon entering the bottom sediments.

A tabular summary of geometric mean field measurements collected in Trout Lake at the two monitoring sites from March 2015-March 2016 is given on Table 2-21. Geometric mean measurements for temperature, conductivity, and Secchi disk depths are virtually identical between the two sites. However, slightly lower values for pH, dissolved oxygen, oxygen saturation, and ORP were measured at Site 2 compared with measurements collected at Site 1, indicating a slight horizontal variability in field measurements within the lake.

A graphical summary of temporal variability in measured values for pH, conductivity, and dissolved oxygen in Trout Lake from March 2015-March 2016 is given on Figure 2-51. Plots are provided for field measurements collected at each of the two monitoring sites at depths of 0.5 m (reflecting surface conditions) and 2.5 m (reflecting near-bottom conditions, although not necessarily at the water-sediment interface).

Measured pH values in Trout Lake appear to exhibit a slight trend of increasing values during the period from May-September 2015 at each of the two monitoring sites, with pH values at the 2.5 m water depth approximately 0.1-1.0 unit lower than values measured near the surface. A similar trend was exhibited for specific conductivity, with the most elevated values measured during the period from May-September 2015. Relatively consistent conductivity values were observed between the two monitoring sites as well as between the surface and near-bottom measurements.

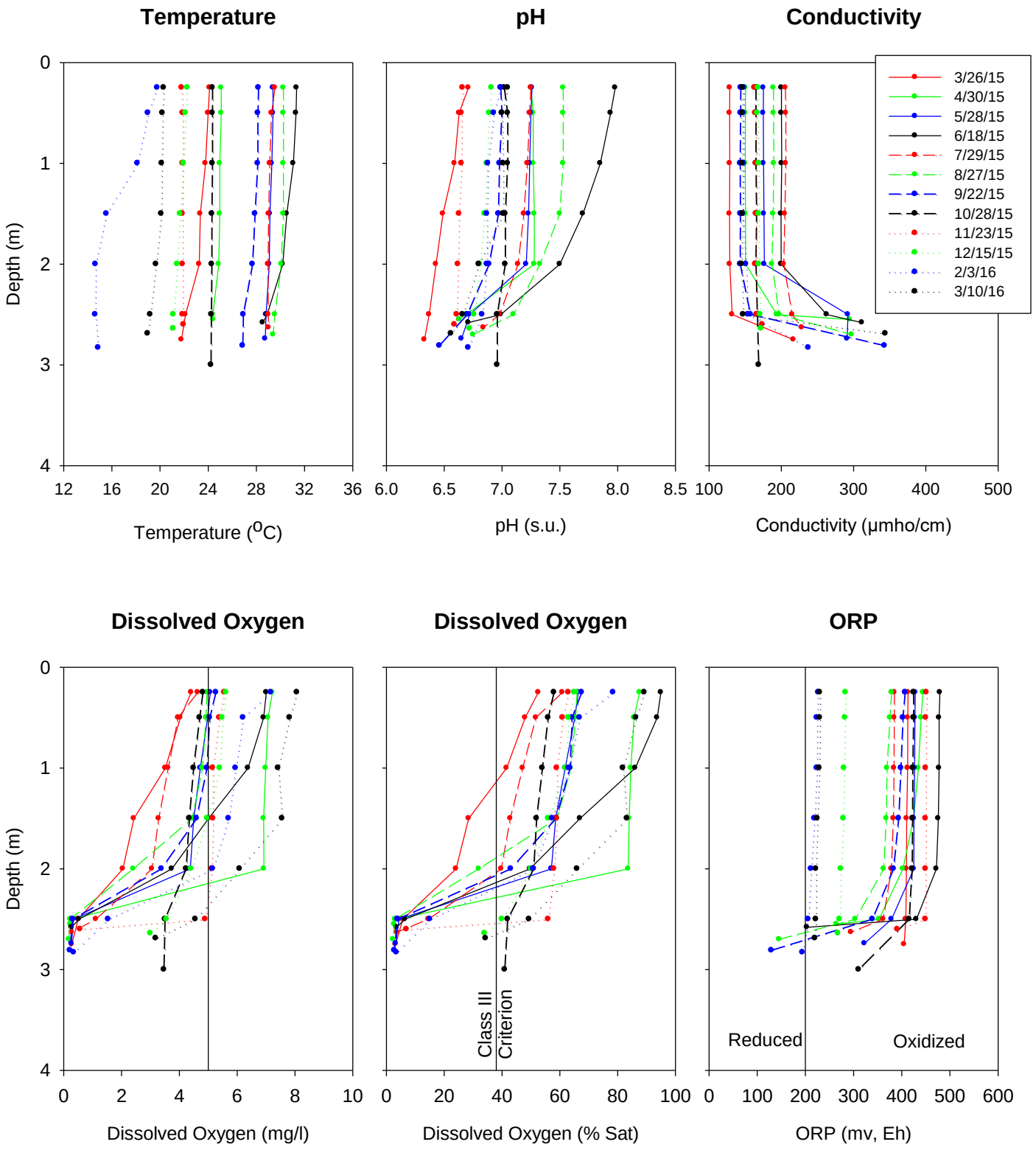


Figure 2-50. Vertical Field Profiles Collected at Site 2 in Trout Lake from March 2015-March 2016.

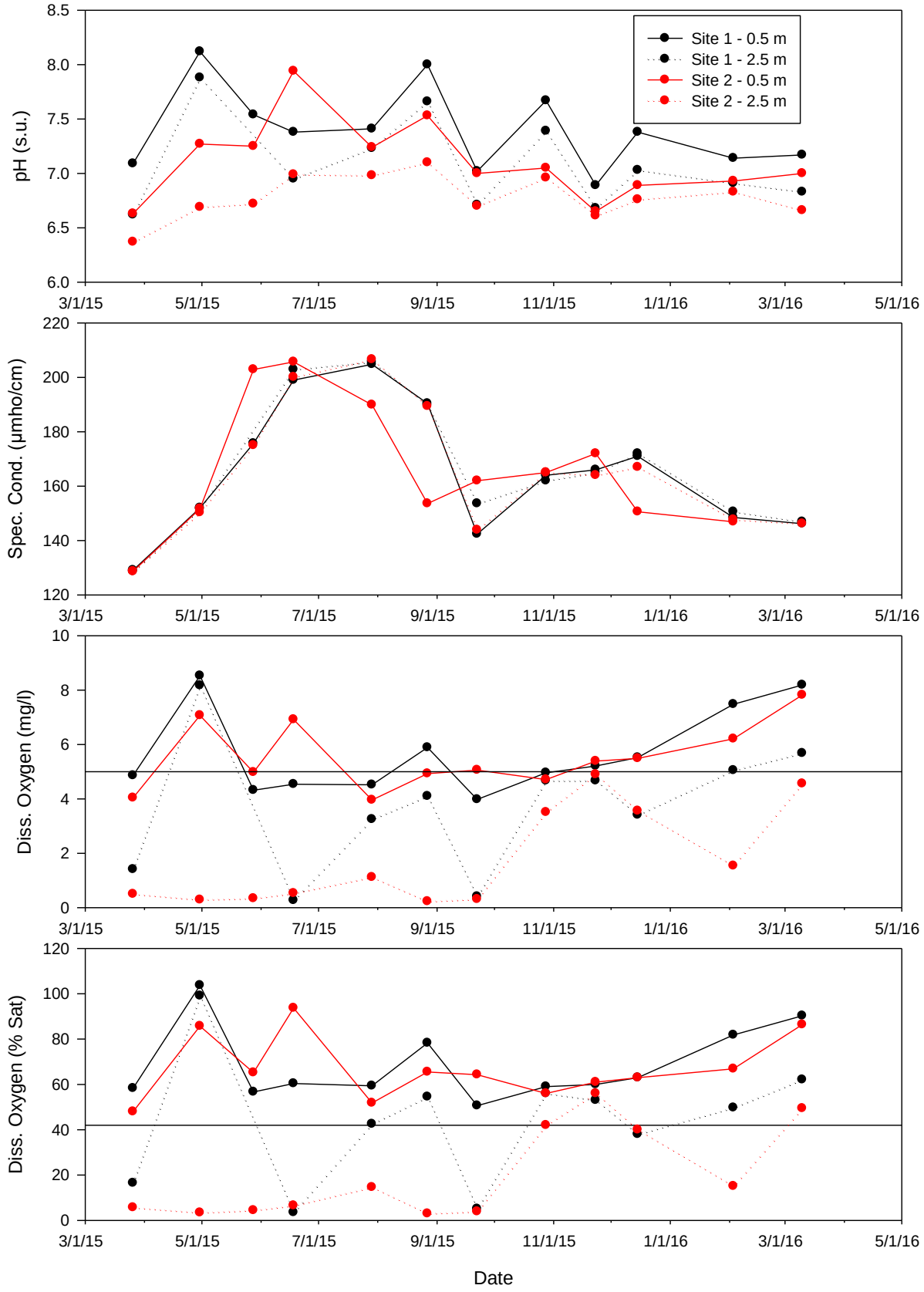


Figure 2-51. Temporal Variability in Measured Field Parameters in Trout Lake from March 2015-March 2016.

TABLE 2-21

GEOMETRIC MEAN FIELD MEASUREMENTS COLLECTED IN TROUT LAKE FROM MARCH 2015-MARCH 2016

SITE	DEPTH (m)	TEMPERATURE (^{o}C)	pH (s.u.)	CONDUCTIVITY (µmho/cm)	DISSOLVED OXYGEN (mg/l)	DISSOLVED OXYGEN SATURATION (%)	ORP (mv)	SECCHI DISK DEPTH
1	0.25	25.29	7.50	164	5.9	72	424	0.54
	0.50	25.18	7.39	164	5.5	67	421	
	1.00	25.09	7.32	164	5.2	63	418	
	1.50	24.93	7.26	164	4.9	60	415	
	2.00	24.27	7.18	164	4.2	51	412	
	2.50	23.94	7.07	166	2.5	30	398	
	3.00	23.48	6.72	237	0.7	8	328	
2	0.25	25.23	7.13	164	5.7	70	369	0.54
	0.50	25.10	7.11	164	5.4	66	367	
	1.00	24.92	7.09	164	5.2	63	365	
	1.50	24.46	7.05	164	4.7	57	362	
	2.00	24.20	6.99	164	4.0	48	357	
	2.50	23.77	6.78	183	1.0	12	335	
	3.00	23.72	6.66	249	0.5	6	248	

Measured concentrations of dissolved oxygen in Trout Lake were highly variable during the field monitoring program, with surface dissolved oxygen concentrations ranging from approximately 4-9 mg/l. In contrast to the trends observed for pH and conductivity, dissolved oxygen concentrations appear to be lowest during the period from May-September 2015, possibly due to temperature related impacts. Dissolved oxygen concentrations less than 5 mg/l were observed in approximately 50% of the surface measurements collected at each of the two sites. Measured dissolved oxygen concentrations at 2.5 m were substantially lower in value, with one of the field measurements collected at Site 1 reflecting a dissolved oxygen concentration <1 mg/l and 7 of the 12 measurements collected at Site 2 at a depth of 2.5 m were <1 mg/l.

Dissolved oxygen saturation values were highly variable during the field monitoring program, with surface saturation measurements ranging from approximately 45->100% saturation. All of the measurements collected at the 0.5 m depth at the two monitoring sites exceeded the revised Class III dissolved oxygen criterion of 38% saturation. However, the vast majority of oxygen concentrations measured at the 2.5 m depth were less than the 38% saturation value, particularly at Site 2 which is located closest to the area of inflows from the wetlands located on the east end of Trout Lake.

A comparison of temporal variability in measured Secchi depth readings in Trout Lake from March 2015-March 2016 is given on Figure 2-52. Measured Secchi disk depths were relatively consistent at each of the two monitoring sites during the field monitoring program, with measured values ranging from approximately 0.3-0.8 m, reflecting poor water clarity. The highest measured Secchi disk depths were observed during the period from May-August 2015, with the lowest values observed during fall and winter conditions. However, overall, water clarity in Trout Lake was extremely poor due to a combination of high color and elevated algal concentrations.

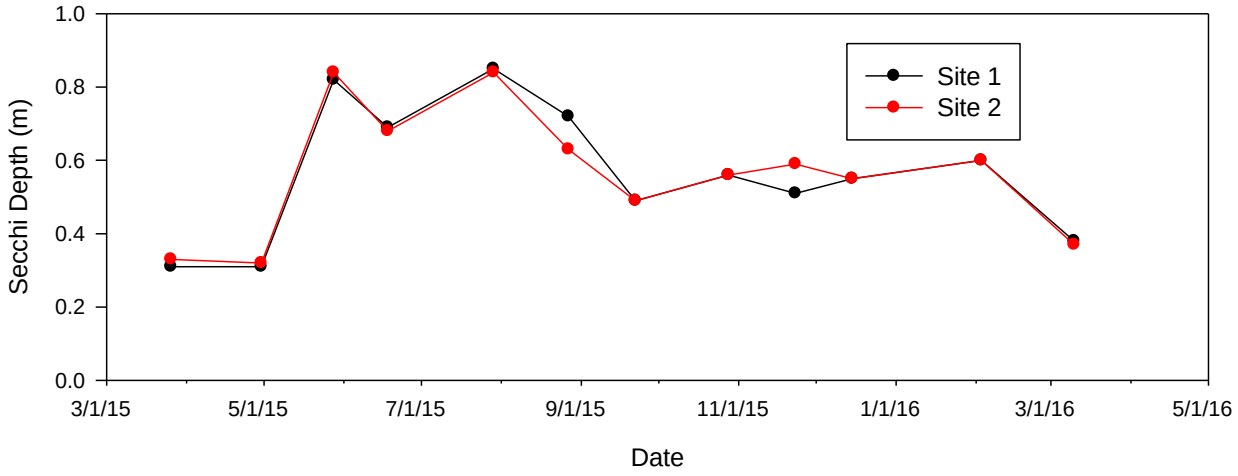


Figure 2-52. Temporal Variability in Measured Secchi Disk Depths in Trout Lake from March 2015-March 2016.

2.4.2.2 Water Quality Characteristics

A complete listing of laboratory analyses conducted on surface water samples collected in Trout Lake from March 2015-March 2016 is given in Appendix D-2. Separate measurements are provided for samples collected from the surface (0.5 m) and samples collected 0.5 m from the water-sediment interface.

A tabular summary of geometric mean values for surface water samples collected in Trout Lake from both surface and bottom areas is given in Table 2-22. Measured alkalinity values in Trout Lake indicate a moderately to poorly buffered system, with overall geometric mean surface alkalinity values ranging from 39.2-41.1 mg/l at the two monitoring sites. The lowest overall mean alkalinity value was observed at Site 2 adjacent to the wetland inflows on the east end of the lake. Geometric mean alkalinity values in the bottom samples were virtually identical between the two sites, ranging from 38.2-38.4 mg/l.

During the field monitoring conducted by ERD, Trout Lake was characterized by low to moderate concentrations of ammonia and NO_x, with overall geometric mean values in the surface samples ranging from 48-59 μg/l. Slightly higher mean value of 104 μg/l was observed in the bottom samples at each site. Low levels of NO_x were also observed with mean surface values ranging from 33-48 μg/l and mean bottom samples ranging from 38-55 μg/l. The more elevated levels of ammonia observed in the samples collected near the lake bottom suggest internal release of ammonia from anoxic bottom sediments.

Dissolved organic nitrogen appears to be the dominant nitrogen species in Trout Lake, comprising approximately 50% or more of the total nitrogen measured within the lake. Overall geometric mean concentrations of dissolved organic nitrogen in surface samples ranged from 818-857 μg/l. Overall mean dissolved organic nitrogen concentrations in the bottom samples were slightly lower in value, ranging from 607-847 μg/l. Particulate nitrogen within the water column of Trout Lake comprised approximately 25% of the total nitrogen measured during the field monitoring program. Particulate nitrogen concentrations appear to be somewhat higher in value in surface samples collected at Site 1 (428 μg/l) compared with surface samples collected at Site 2 (361 μg/l). Particulate nitrogen concentrations in samples collected near the lake bottom were higher in value overall than samples collected from the surface, with overall geometric mean values ranging from 454-520 μg/l.

TABLE 2-22

CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN TROUT LAKE FROM MARCH 2015-MARCH 2016

PARAMETER	UNITS	SITE 1		SITE 2	
		Surface	Bottom	Surface	Bottom
Alkalinity	mg/l	41.1	38.2	39.2	38.4
Ammonia	μg/l	59	104	48	104
NO_x	μg/l	48	38	33	55
Diss. Organic N	μg/l	857	847	818	607
Particulate N	μg/l	428	520	361	454
Total N	μg/l	1,612	1,722	1,494	1,514
SRP	μg/l	157	183	174	194
Diss. Organic P	μg/l	43	38	24	24
Particulate P	μg/l	53	54	64	58
Total P	μg/l	270	290	280	290
Turbidity	NTU	2.8	3.0	3.2	2.7
Color	Pt-Co	206	218	230	233
TSS	mg/l	3.5	4.2	3.6	4.2
Chlorophyll-a	mg/m^3	13.3	--	12.0	--
TN/TP Ratio	--	6.0	--	5.3	--
TSI[1]	--	52	--	50	--

1. Based on chlorophyll-a only

Measured concentrations of total nitrogen in Trout Lake were moderate to slightly elevated in value, with overall mean surface concentrations ranging from 1,494-1,612 μg/l, and bottom samples ranging from 1,514-1,722 μg/l. It is interesting to note that the overall mean concentrations of nitrogen species at Site 1 (located on the west side of Trout Lake) were greater for each of the evaluated nitrogen parameters than samples collected from the surface at Site 2 on the east end of Trout Lake near the point of inflow from the wetland area. This trend is particularly apparent in the observed total nitrogen concentrations, with the overall mean concentration measured at Site 1 approximately 118 μg/l greater than collected at Site 2. Since the wetland areas adjacent to Site 2 reflect the primary inflows to Trout Lake, the increase in total nitrogen in the lake during migration from Site 2 to Site 1 (east to west) suggests an internal source of nitrogen which is impacting nitrogen species during migration through the lake.

Measured soluble reactive phosphorus (SRP) values in Trout Lake were extremely elevated in value, with measured mean surface concentrations ranging from 157-174 μg/l. Values in this range are approximately 10-100 times greater than SRP concentrations commonly observed in non-colored lakes in Central Florida. The elevated SRP values, along with the observed elevated color levels in Trout Lake, are likely related to inflows from the wetland areas surrounding the eastern end of Trout Lake. Elevated levels of both SRP and color are common characteristics of discharges from hardwood wetland areas, and these wetland inflows are clearly having a significant impact on water quality in Trout Lake. SRP concentrations in the bottom samples appear to be somewhat higher in value, ranging from 183-194 μg/l, suggesting internal release of soluble phosphorus from the sediments.

Relatively low concentrations were observed in both surface and bottom samples for dissolved organic phosphorus and particulate phosphorus, particularly in comparison with the measured SRP values, with similar values between surface and bottom samples.

Measured total phosphorus concentrations in Trout Lake were extremely elevated in value, with mean surface concentrations ranging from 270-280 μg/l and an overall mean bottom concentration of 290 μg/l at each site. Total phosphorus concentrations in this range are easily an order of magnitude greater than phosphorus concentrations commonly observed in non-colored lakes in Central Florida. The elevated total phosphorus concentrations are due primarily to the substantially elevated SRP values and are common in lakes exhibiting high color.

Measured concentrations of turbidity and TSS were generally low in value in both top and bottom samples collected in Trout Lake. Trout Lake is highly colored, with mean surface color values ranging from 206-230 Pt-Co and mean bottom values ranging from 218-233 Pt-Co. Color values appear to decrease slightly between Site 2 and Site 1, suggesting dilution of some of the color introduced from the wetland areas on the east end of the lake.

Overall mean surface concentrations of chlorophyll-a were low in value, with mean concentrations ranging from 12.0-13.3 mg/m^3, although chlorophyll-a concentrations in Trout Lake were elevated at times. Under existing conditions, Trout Lake has an abundance of inorganic phosphorus and a moderate supply of inorganic nitrogen to support additional algal growth. However, additional growth of algae in Trout Lake appears to be limited by light penetration resulting from the elevated color values. If the color concentrations were to be substantially reduced in Trout Lake, algal productivity would likely increase substantially.

Measured TN/TP ratios in Trout Lake were generally low in value, with an overall geometric mean TN/TP ratio of 6.0 at Site 1 and 5.3 at Site 2. Values in this range are commonly assumed to reflect nitrogen-limited conditions, although nutrient ratios have little meaning in colored eutrophic lakes. Calculated TSI values for Trout Lake, based on measurements of chlorophyll-a only, were generally low in value, with an overall mean of 52 for Site 1 and 50 for Site 2. TSI values in this range are typically considered to reflect mesotrophic conditions which is also consistent with the mean measured values for chlorophyll-a. Therefore, it appears that mesotrophic conditions were primarily present in Trout Lake during the field monitoring program.

A graphical summary of temporal variability in measured values for alkalinity, color, turbidity, and TSS in Trout Lake samples collected from March 2015-March 2016 is given on Figure 2-53. Separate plots are provided for samples collected at top and bottom monitoring depths at each of the two monitoring sites. In general, measured alkalinity values appear to be relatively similar between each of the two monitoring sites in the surface collected samples. Peak alkalinity values in Trout Lake were observed during the period from June-September 2015, with measured values ranging from approximately 40-60 mg/l, decreasing to values less than 40 mg/l during other portions of the year. Alkalinity values in samples collected 0.5 m from the lake bottom appear to be lower in value compared with surface samples during many monitoring dates.

In contrast to the trend observed for alkalinity, measured color values appear to be lowest during summer conditions, with values ranging from 100-150 Pt-Co units. Substantial increases in alkalinity appear to occur in late-summer and early-fall, followed by a decrease in alkalinity during the winter months. The observed increases in color and decreases in alkalinity observed during late-summer and fall may be related to the timing of wetland inflows which occur along the east border of the lake. These inflows only originate after the significant internal attenuation within the large watershed area fills and begins to discharge into Trout Lake. Given the extent of the watershed and opportunities for attenuation, inflows often do not begin to occur until late-summer and fall conditions.

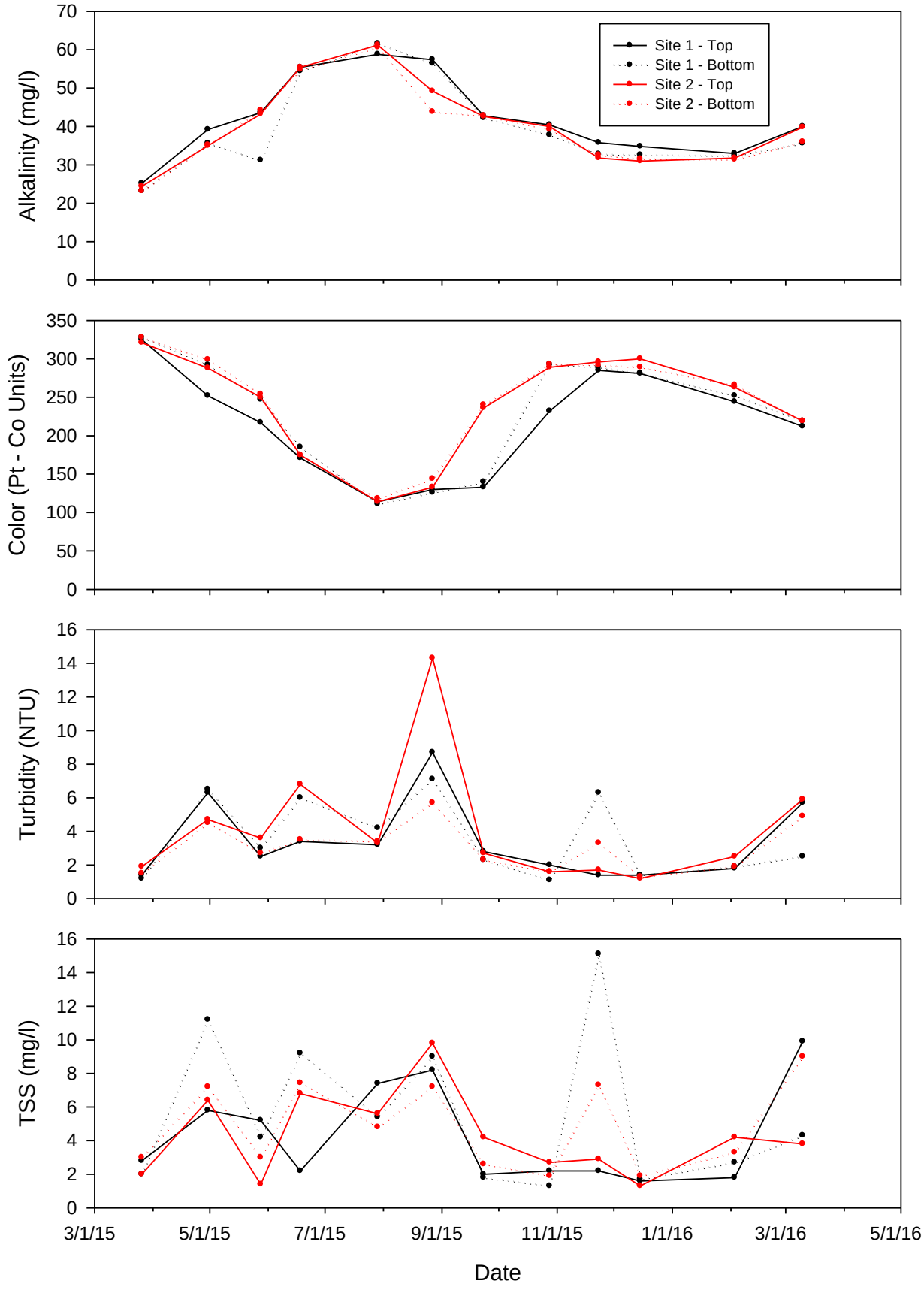


Figure 2-53. Temporal Variability in Measured Values for Alkalinity, Color, Turbidity, and TSS in Trout Lake Samples Collected from March 2015-March 2016.

Measured values for turbidity and TSS were highly variable in Trout Lake over time, with peak concentrations appearing to occur during summer conditions and lower values during remaining portions of the year. Overall, samples collected 0.5 m from the lake bottom appear to have lower turbidity values than surface values, while the reverse trend is apparent for TSS, with higher concentrations observed in bottom samples compared with top samples.

A graphical comparison of temporal variability in nitrogen species in Trout Lake samples collected from March 2015-March 2016 is given in Figure 2-54. Peaks in concentrations for ammonia, NO_x, and dissolved organic nitrogen appear to occur in Trout Lake during late-summer and fall conditions, consistent with the commencement of wetland inflows during these periods. During wetland inflows, concentrations of ammonia increase in Trout Lake by a factor of 4-10, with an even larger increase in concentrations of NO_x. Dissolved organic nitrogen concentrations appear to double during late-summer and fall conditions compared with values measured during remaining portions of the year, with only a slight increase for particulate nitrogen during this period. Overall, measured total nitrogen concentrations in Trout Lake peaked during late-fall conditions at concentrations of approximately 2,500 μg/l, decreasing to values ranging from 1,000-2,000 μg/l during the remaining portions of the year. The overall concentrations of ammonia and NO_x observed during peak periods for these parameters reflect extremely elevated values for a Central Florida lake.

A graphical summary of temporal variability in measured concentrations of phosphorus species in Trout Lake from March 2015-March 2016 is given on Figure 2-55. In general, measured concentrations of SRP were elevated in value in Trout Lake throughout the 12-month monitoring period, with values 10-100 times greater than commonly observed in non-colored Central Florida lakes. Peak concentrations of SRP occurred in Trout Lake during winter and spring conditions, with a similar pattern also exhibited by dissolved organic phosphorus. Peaks in particulate phosphorus were observed during summer conditions and may be related to algal biomass. Overall, concentrations of total phosphorus in Trout Lake appeared to be lowest during summer and early-fall conditions, with the highest values observed during winter and spring. Elevated phosphorus concentrations during these periods are often associated with sediment phosphorus release through internal recycling. Measured concentrations of both SRP and total phosphorus appear to be relatively similar between the two monitoring locations, with a slight trend of higher concentrations of particulate phosphorus observed at Site 2 and dissolved organic phosphorus observed at Site 1.

A graphical summary of temporal variability in measured concentrations of chlorophyll-a, TN/TP ratios, and TSI values in Trout Lake from March 2015-March 2016 is given on Figure 2-56. Chlorophyll-a values in Trout Lake were highly variable throughout the 12-month monitoring period, with peak concentrations observed prior to September and a drastic decrease in concentrations during late-summer and fall conditions. The observed decrease in chlorophyll-a concentrations in Trout Lake may be related to the dramatic increase in color also observed during this time which restricts light penetration within the water column and reduces availability for algal growth. The observed temporal plots for chlorophyll-a and color appear to exhibit inverse relationships, with elevated levels of chlorophyll-a observed during periods of lower color within the lake.

Calculated TN/TP ratios in Trout Lake ranged from approximately 2-10 during the field monitoring program from March 2015-March 2016, with relatively similar ratios observed between the two monitoring sites and between top and bottom samples. The calculated ratios suggest nitrogen limitation in Trout Lake, although TN/TP ratios have little meaning in eutrophic highly colored waters.

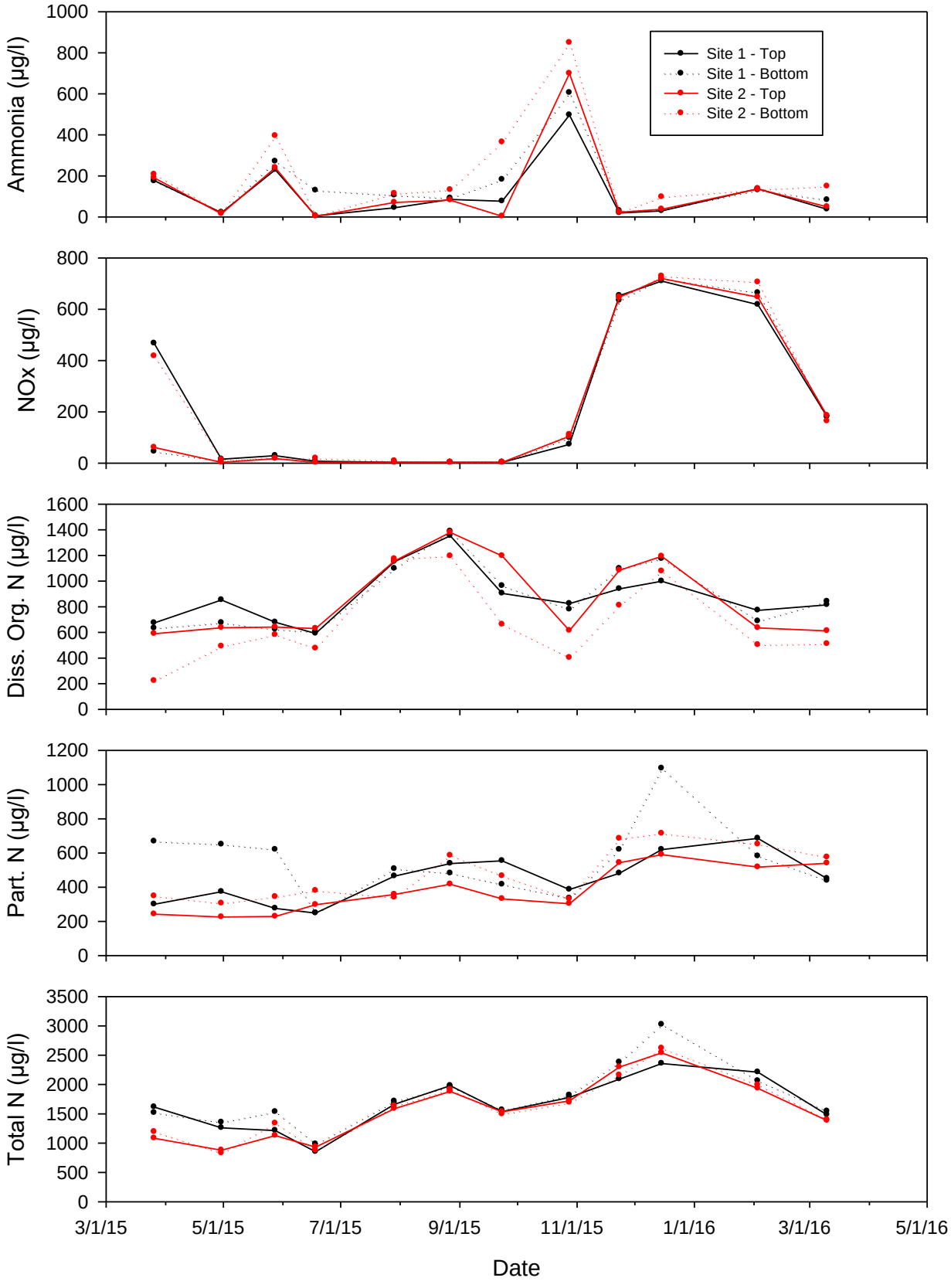


Figure 2-54. Temporal Variability in Measured Values for Nitrogen Species in Trout Lake Samples Collected from March 2015-March 2016.

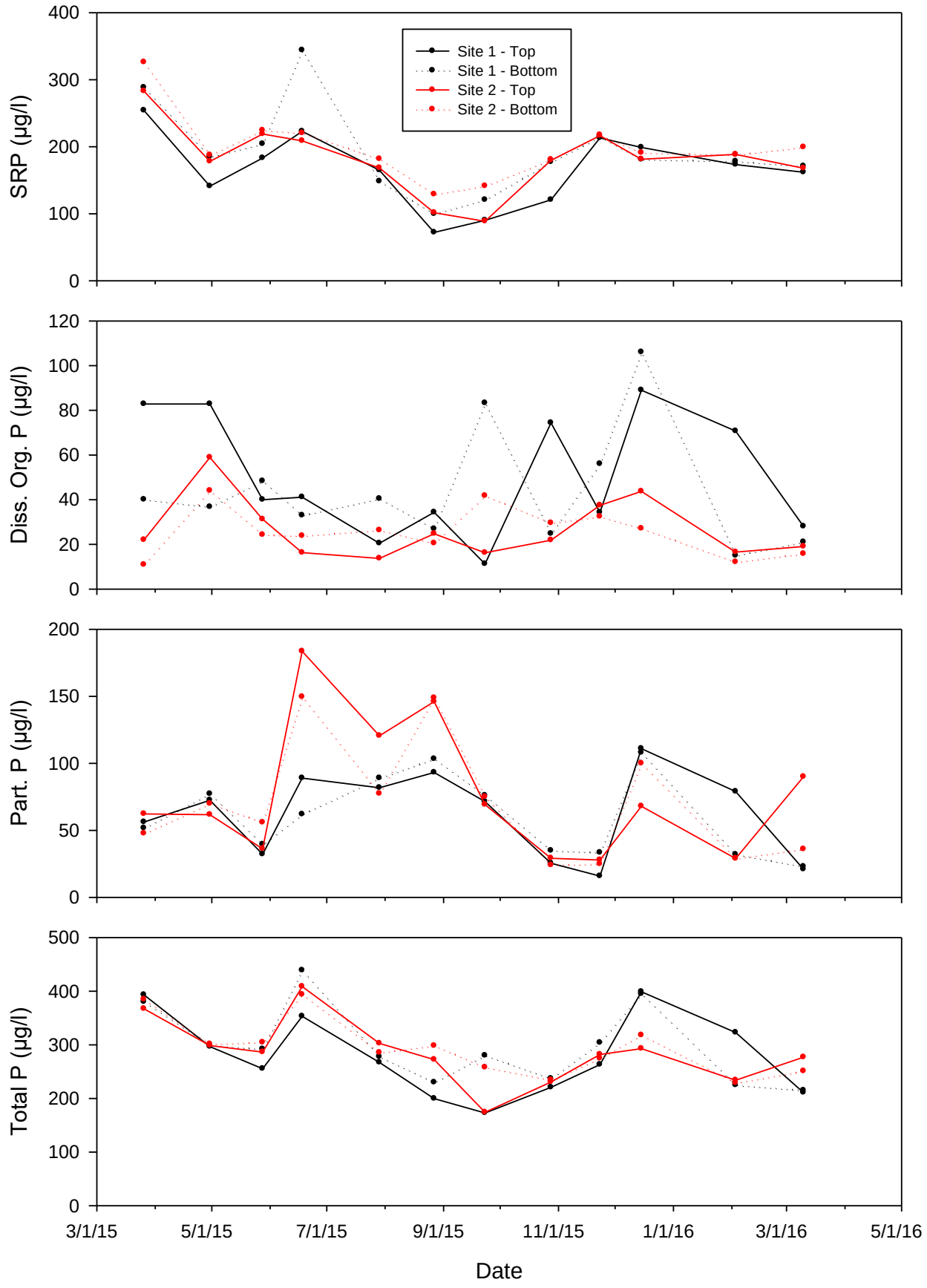


Figure 2-55. Temporal Variability in Measured Values for Phosphorus Species in Trout Lake Samples Collected from March 2015-March 2016.

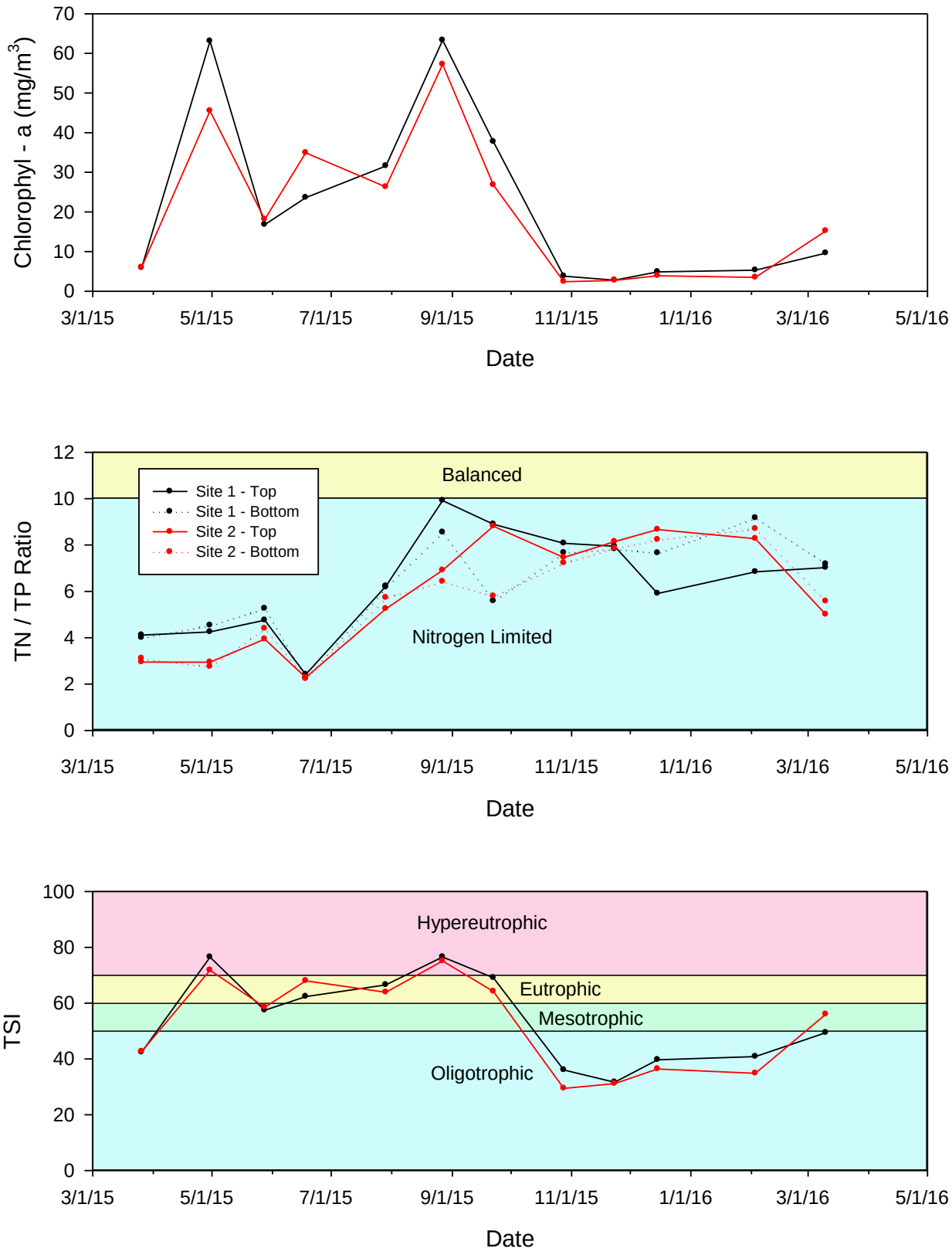


Figure 2-56. Temporal Variability in Measured Values for Chlorophyll-a, TN/TP Ratios, and TSI Values in Trout Lake Samples Collected from March 2015-March 2016.

Calculated TSI values in Trout Lake ranged from approximately 30-80 during the field monitoring program, reflecting a wide range of trophic conditions. Mesotrophic or oligotrophic conditions were observed in Trout Lake during 7 of the 12 monitoring events, with eutrophic or hypereutrophic conditions observed during the remaining events. TSI values appear to be greatest during the period from May-September 2015, with substantially lower values during remaining portions of the year.

2.4.3 Lake Yale

2.4.3.1 Field Measurements

A graphical summary of vertical field profiles collected at Site 1 in Lake Yale from March 2015-March 2016 is given on Figure 2-57. Measured water depths at this site during the field monitoring program ranged from 3.58-4.08 m. Virtually isograde temperature profiles were observed at this site on each of the 12 monitoring dates, with only a slight decrease in temperature with increasing water depth. No evidence of classical thermal stratification was observed at Site 1 during any of the field events. Measured surface (0.5 m) temperatures ranged from 18.31-31.47^{o}C during the field monitoring program, with bottom temperatures ranging from 16.26-29.78^{o}C.

Virtually isograde profiles were observed at Site 1 for pH within the top 3 m of the water column during each of the 12 monitoring events, with measured surface (0.5 m) pH values ranging from 7.80-9.07 during the field monitoring program. Measured pH values exhibited a rapid decrease at a depth of 3 m during each of the field monitoring events, with measured bottom pH values ranging from 7.0-8.16.

Measured conductivity values at Site 1 in Lake Yale exhibited virtually isograde profiles within the top 3 m during each of the 12 monitoring events. Conductivity values at Site 1 ranged from approximately 371-420 μmho/cm. Below a depth of 3 m, conductivity generally increased, with bottom measurements ranging from 398-510 μmho/cm. The observed increases in conductivity near the water-sediment interface are an indication of internal recycling occurring at this site.

Measured surface concentrations of dissolved oxygen at Site 1 ranged from 6.1-10.2 mg/l. Dissolved oxygen concentrations exhibited a gradual decrease with increasing water depth to a depth of 3 m. Above a depth of 3 m, oxygen concentrations in excess of 5 mg/l were observed during all monitoring events. However, below this depth, dissolved oxygen concentrations decreased rapidly to values ranging from 1-2 mg/l. A similar trend is also apparent for dissolved oxygen saturation, with saturation values well in excess of the 38% dissolved oxygen criterion at depths of 3 m or less during all 12 monitoring events. Below a depth of 3 m, oxygen saturation decreases rapidly to values generally less than 10-20%.

Measured ORP values at Site 1 exhibited relatively isograde profiles throughout the entire water column to a depth of 3 m or more during each of the 12 monitoring events. ORP values decreased rapidly below a depth of 3 m during most events, approaching a value of 200 mv.

A graphical summary of vertical field profiles collected at Site 2 in Lake Yale from March 2015-March 2016 is given on Figure 2-58. Measured water depths at this site ranged from 2.93-4.05 m during the field monitoring program. Virtually isograde temperature profiles were observed at this site on each of the 12 monitoring dates, with only a slight decrease in temperature in lower layers of the water column during one event. Overall, the water column at Site 2 appears to be well mixed. No evidence of classical thermal stratification was observed at Site 2 during any of the field monitoring events.

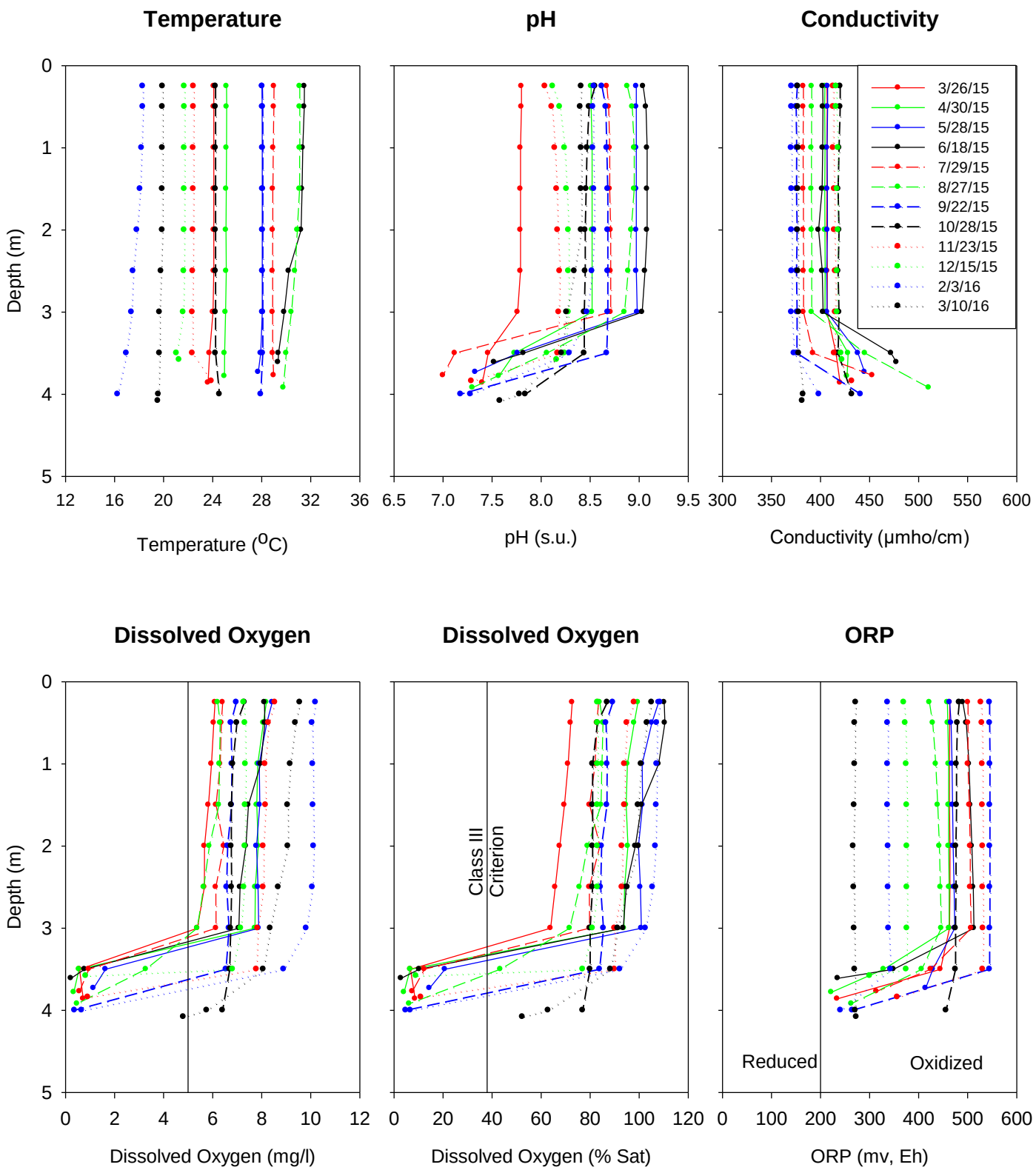


Figure 2-57. Vertical Field Profiles Collected at Site 1 in Lake Yale from March 2015-March 2016.

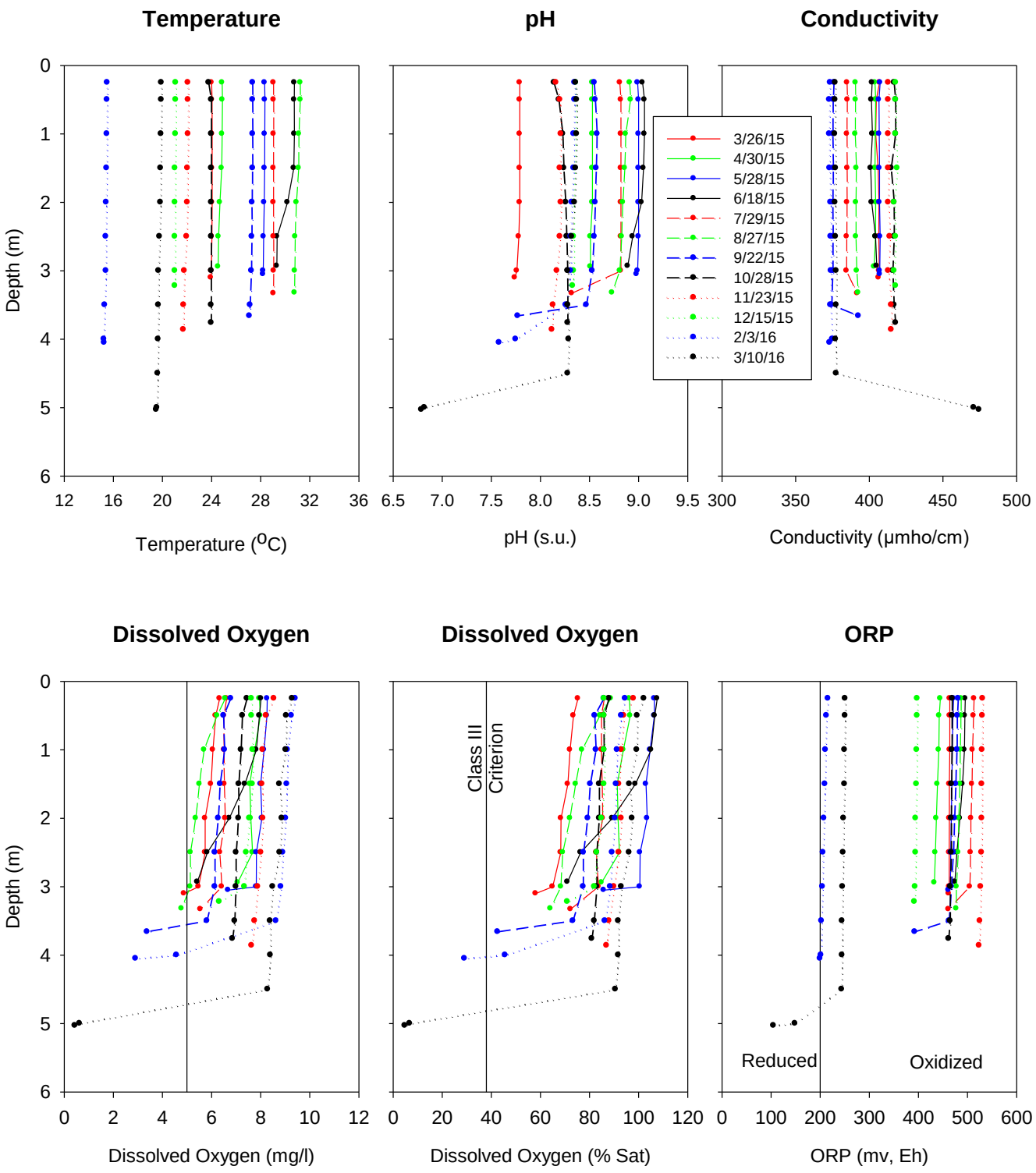


Figure 2-58. Vertical Field Profiles Collected at Site 2 in Lake Yale from March 2015-March 2016.

Virtually isograde profiles were also observed for pH, particularly in the top 3 m of the water column. Below this depth, decreases in pH were observed near the water-sediment interface during most events, with the observed decreases ranging from approximately 0.1 to greater than 1 unit.

Measured conductivity values at Site 2 in Lake Yale also exhibited relatively isograde values throughout the entire water column until reaching the water-sediment interface. At this interface, increases in specific conductivity were observed during 4 of the 12 monitoring events, suggesting that internal recycling may be occurring at this location on a periodic basis.

Relatively isograde profiles were observed at this site for both dissolved oxygen concentration and oxygen saturation, with only a slight decrease in each variable with increasing water depth. However, both oxygen concentration and saturation percentage decreased rapidly near the water-sediment interface during 4 of the 12 monitoring events. The events of low dissolved oxygen near the water-sediment interface correspond well with the events where increases in conductivity were also observed.

Measured redox potential values at Site 2 were also relatively isograde during virtually all events, with oxidized conditions maintained within the water column at all times, with the exception of reduced conditions measured near the water-sediment interface during March 2016. Overall, the field data suggest relatively well mixed conditions at Site 2 during the field monitoring program.

A graphical summary of vertical field profiles collected at Site 3 in Lake Yale from March 2015-March 2016 is given on Figure 2-59. Measured water depths at this site ranged from 2.78-3.40 m during the field monitoring program. Isograde temperature profiles were observed during all events at this site, with no significant decrease in pH with increasing water depth during any event.

Measured pH values also exhibited relatively isograde conditions, with decreases in pH observed at the water-sediment interface during all events, ranging from approximately 0.1 to more than 1 unit. Isograde profiles were also observed for conductivity, with increases in conductivity observed near the water-sediment interface during 11 of the 12 monitoring events.

Measured conductivity values at Site 3 exhibited isograde profiles to a depth of approximately 2.5 m. Below this depth, increases in specific conductivity were observed near the water-sediment interface during a majority of the monitoring events, suggesting a moderate degree of internal recycling may be occurring at this site.

Isograde profiles were also observed for dissolved oxygen concentration and saturation percentage to water depths of approximately 2.5 m, with a rapid decrease in each of these parameters below 2.5 m. Water column concentrations of dissolved oxygen at Site 3 exceeded the historical criterion of 5 mg/l during 10 of the 12 monitoring events, with concentrations substantially less than 5 mg/l at depths below 2.5 m. Oxygen saturation percentages exceeded the minimum Class III criterion of 38% in the top 2 m of the water column during each of the 12 monitoring events. Based upon the revised oxygen criterion involving percent saturation, oxygen values at Site 3 easily met the applicable Class III criterion throughout the field monitoring program.

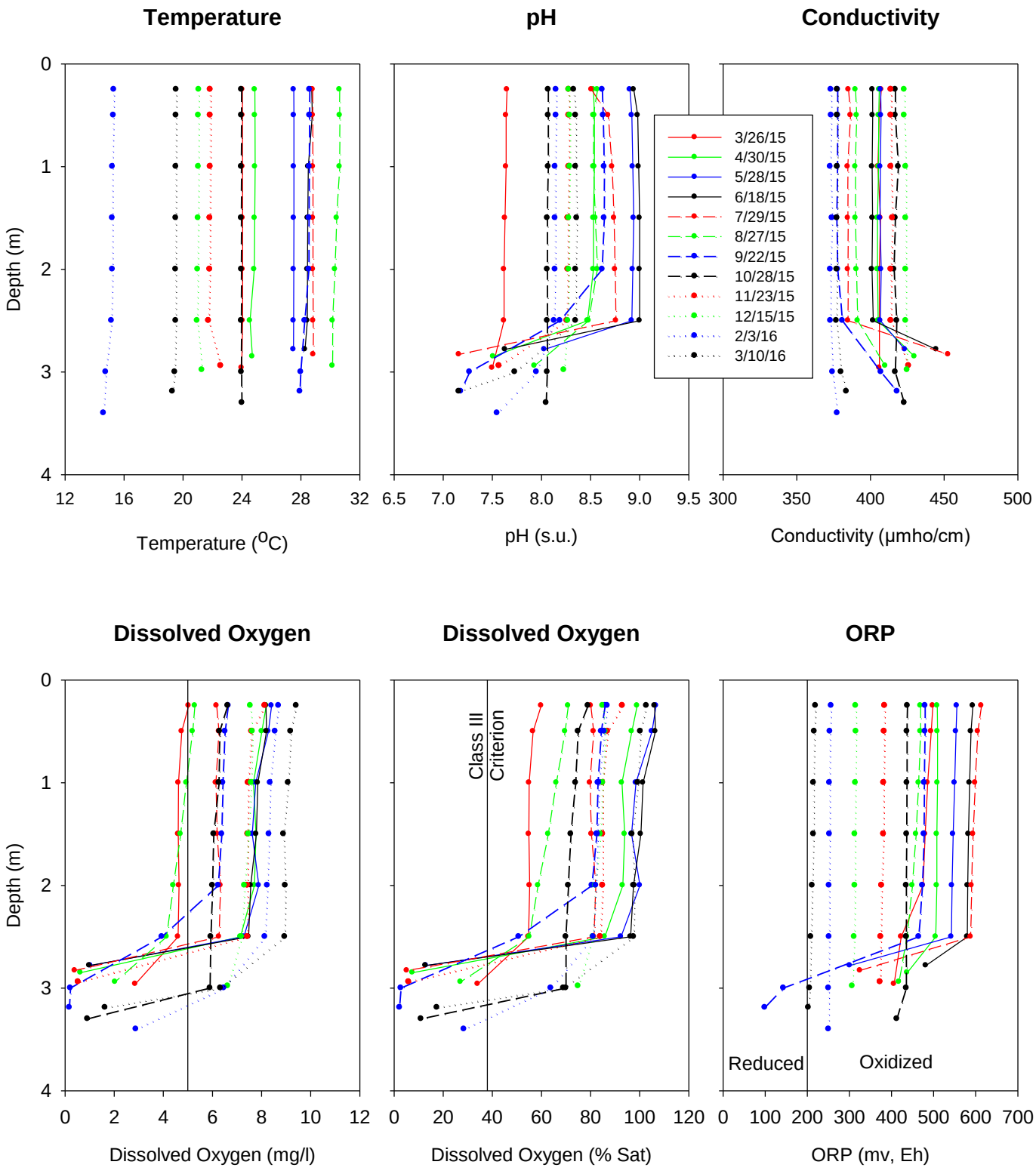


Figure 2-59. Vertical Field Profiles Collected at Site 3 in Lake Yale from March 2015-March 2016.

Measured redox potential values at Site 3 were also relatively isograde during each of the 12 monitoring events, with a decrease in ORP values observed at depths below 2.5 m during approximately half of the monitoring events. However, overall, oxidized conditions were maintained within the water column at depths above 2.5 m throughout the field monitoring program.

A graphical summary of vertical field profiles collected at Site 4 in Lake Yale from March 2015-March 2016 is given on Figure 2-60. Site 4 is the deepest of the monitoring sites in Lake Yale, with water depths during the field monitoring program ranging from 3.27-5.65 m. Relatively isograde profiles were observed for temperature, pH, and conductivity to water depths of approximately 4 m or more. Below this depth, decreases in pH values were observed during virtually all of the monitoring events, with increases in specific conductivity near the water-sediment interface during approximately half of the monitoring events. Dissolved oxygen concentrations in excess of 5 mg/l were maintained within the water column to a depth of 4 m followed by a rapid decrease in oxygen to the water-sediment interface. Dissolved oxygen concentrations in the upper 4 m easily met the oxygen saturation criterion of 38%, and oxidized conditions were maintained within upper portions of the water column during all events. Overall, it appears that the water column at Site 4 is extremely well mixed throughout the year, with virtually no vertical variability in water characteristics.

A graphical summary of vertical field profiles collected at Site 5 in Lake Yale from March 2015-March 2016 is given on Figure 2-61. Water depths at this site ranged from 1.36-1.86 m, and this is the most shallow of the five monitoring sites. Relatively isograde temperature profiles were observed at this site, with only a slight trend of decreasing temperatures below a depth of 1 m during 2-3 of the monitoring events. Measured pH values at this site exhibited a slight decrease with increasing water depth, with a more rapid decrease observed at water depths below 1 m during approximately half of the monitoring events. Conductivity values were also relatively uniform to a water depth of 1-1.5 m, although substantial increases in conductivity were observed at water depths below 1 m during summer monitoring events.

Dissolved oxygen concentrations at Site 5 were low to moderate in value, with approximately half of the monitoring events characterized by oxygen concentrations less than 5 mg/l. Oxygen saturation percentages at this site were somewhat lower than observed in other portions of Lake Yale, with 3 of the 11 monitoring events characterized by average oxygen saturation values less than the Class III criterion of 38%. The water column at Site 5 exhibited oxidized conditions during a majority of the monitoring events, although slightly reduced conditions were observed during November 2015. Rapid decreases in ORP values were observed near the water-sediment interface during about half of the monitoring events at this site.

Overall, Site 5 appears to be more stratified with respect to the measured field parameters than observed at the other Lake Yale monitoring sites. This difference may be related to the shallow water column and relatively isolated nature of the area adjacent to Site 5.

A tabular summary of geometric mean field measurements collected in Lake Yale at the five monitoring sites from March 2015-March 2016 is given on Table 2-23. Geometric mean measurements for temperature, conductivity, dissolved oxygen, and ORP are virtually identical for Sites 1-4 which are located in the main portion of Lake Yale. Slightly different characteristics for these parameters were observed at Site 5 which is located in the small cove area on the east side of the lake.

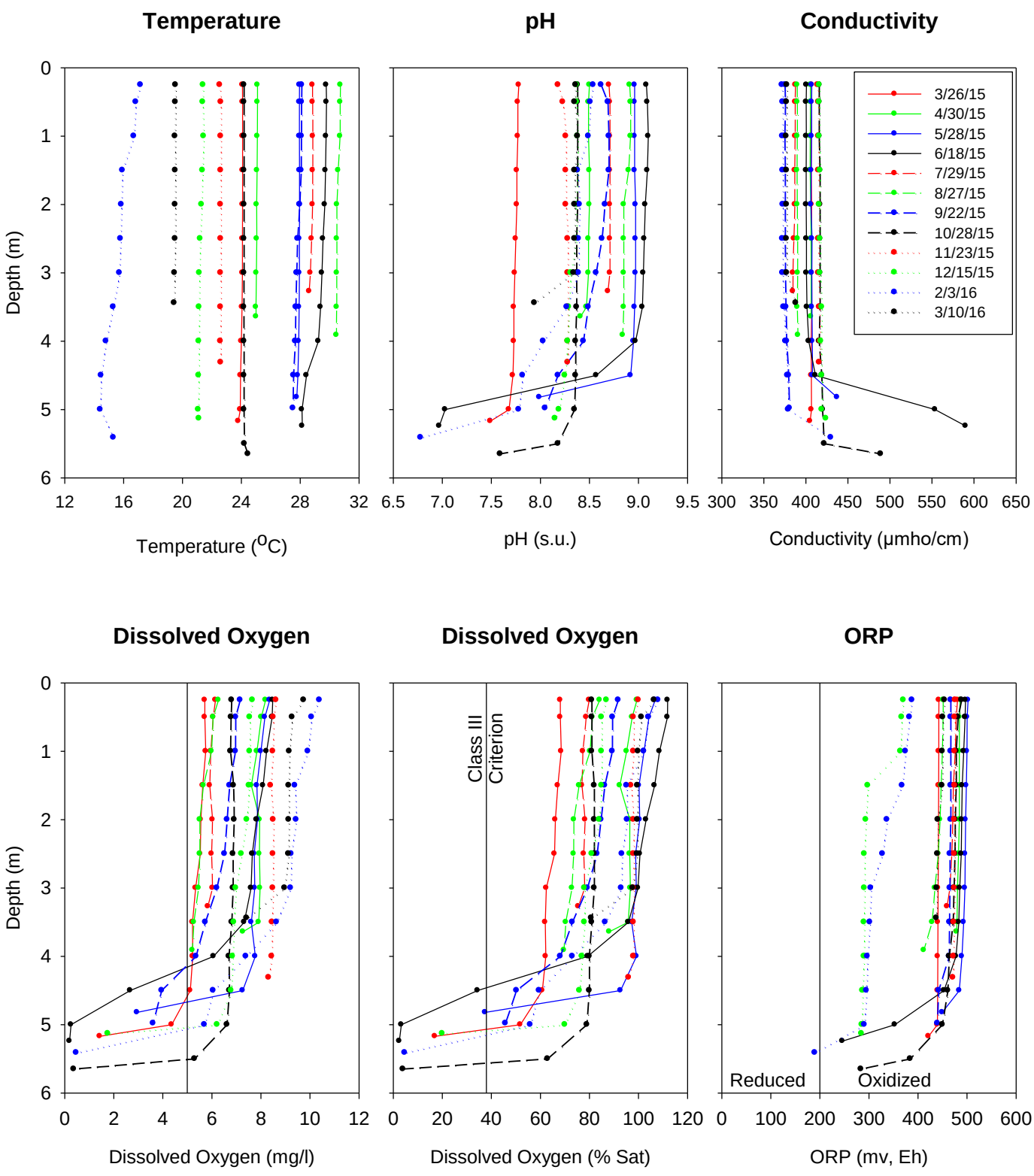


Figure 2-60. Vertical Field Profiles Collected at Site 4 in Lake Yale from March 2015-March 2016.

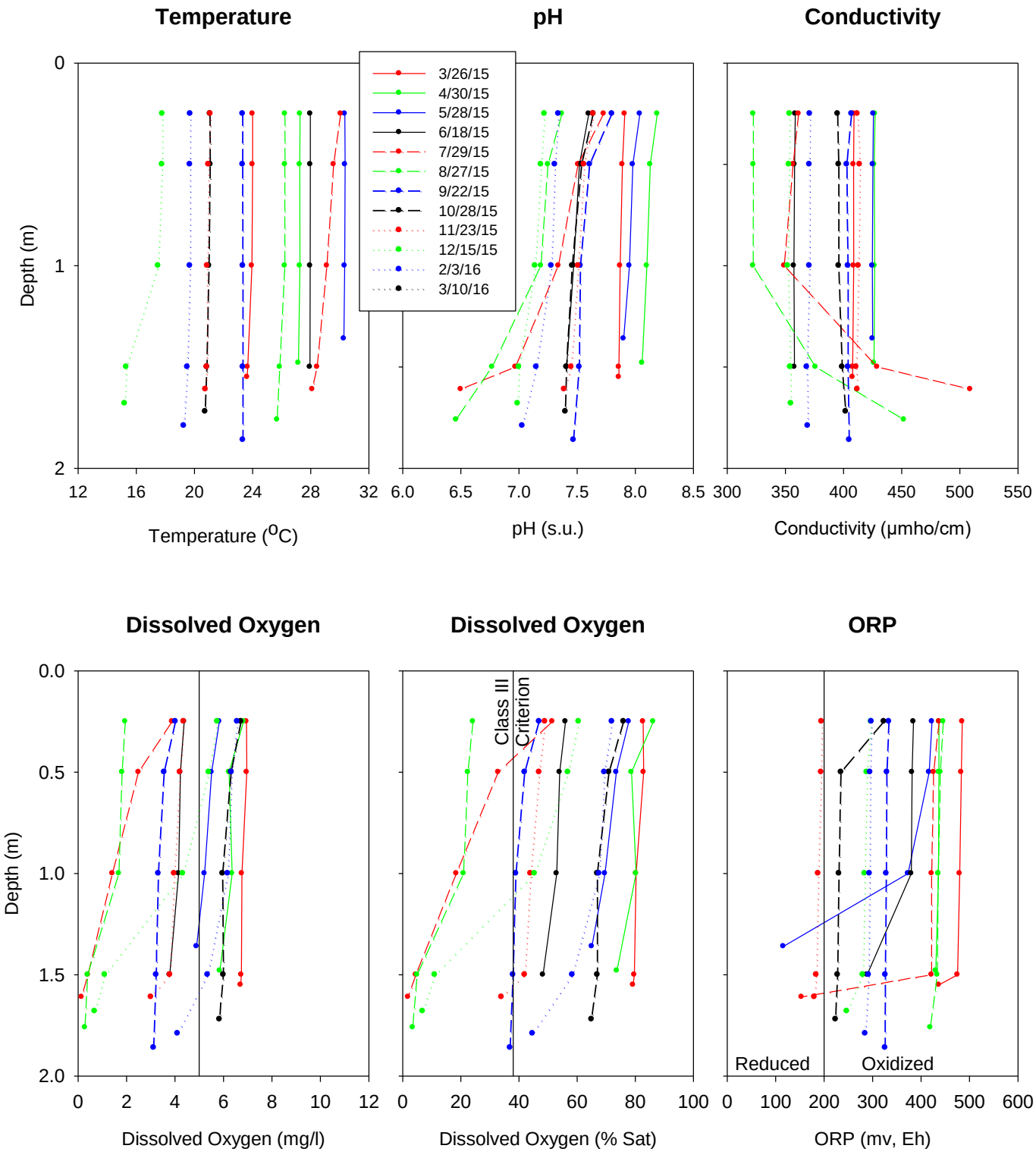


Figure 2-61. Vertical Field Profiles Collected at Site 5 in Lake Yale from March 2015-March 2016.

TABLE 2-23

GEOMETRIC MEAN FIELD MEASUREMENTS COLLECTED IN LAKE YALE FROM MARCH 2015-MARCH 2016

SITE	DEPTH (m)	TEMPERATURE (^{o}C)	pH (s.u.)	CONDUCTIVITY (µmho/cm)	DISSOLVED OXYGEN (mg/l)	DISSOLVED OXYGEN SATURATION (%)	ORP (mv)	SECCHI DISK DEPTH
1	0.25	25.06	8.48	398	7.6	92	445	0.75
	0.50	25.07	8.49	398	7.5	91	446	
	1.00	25.04	8.50	398	7.3	89	447	
	1.50	25.03	8.51	398	7.3	88	447	
	2.00	24.98	8.51	398	7.2	88	447	
	2.50	24.87	8.50	398	7.1	86	448	
	3.00	24.78	8.41	400	6.0	73	430	
	3.50	24.40	7.97	413	2.9	35	405	
	4.00	24.67	7.58	431	1.1	14	309	
2	0.25	24.34	8.49	397	7.7	93	443	0.71
	0.50	24.37	8.50	397	7.5	91	441	
	1.00	24.35	8.51	397	7.4	89	440	
	1.50	24.34	8.50	397	7.3	88	439	
	2.00	24.27	8.50	397	7.2	86	436	
	2.50	24.18	8.48	397	7.0	84	435	
	3.00	24.14	8.47	397	6.9	82	433	
	3.50	23.60	8.31	398	6.4	76	423	
	4.00	23.69	8.27	399	5.9	71	409	
3	0.25	24.16	8.40	398	7.2	87	425	0.65
	0.50	24.16	8.41	398	7.1	85	423	
	1.00	24.13	8.42	398	6.9	82	420	
	1.50	24.10	8.42	398	6.8	82	418	
	2.00	24.09	8.42	398	6.8	81	415	
	2.50	24.01	8.37	398	6.3	76	408	
	3.00	24.04	7.71	416	1.6	19	323	
	3.50	20.86	7.48	400	0.9	11	214	
4	0.25	24.64	8.52	397	7.6	92	435	0.60
	0.50	24.61	8.53	397	7.5	91	433	
	1.00	24.59	8.54	397	7.4	90	431	
	1.50	24.47	8.52	397	7.3	88	422	
	2.00	24.43	8.52	397	7.3	88	418	
	2.50	24.38	8.51	397	7.2	86	416	
	3.00	24.34	8.49	397	7.1	85	411	
	3.50	24.26	8.47	398	6.9	83	409	
	4.00	23.80	8.41	399	6.7	80	401	
	4.50	22.88	8.26	401	5.8	68	386	
5	0.25	24.11	7.67	384	4.9	59	358	0.69
	0.50	24.05	7.58	384	4.5	54	344	
	1.00	23.96	7.53	383	4.0	48	338	
	1.50	23.52	7.40	395	2.7	31	294	
	2.00	21.77	7.12	412	1.6	18	267	

A graphical summary of temporal variability in measured field parameters in Lake Yale from March 2015-March 2016 is given on Figure 2-62. Graphical plots are included for each of the five monitoring sites for field measurements collected at a water depth of 0.5 m. Plots are also provided for each site to compare field measurements in lower portions of the water column at a water depth of 3 m at Sites 1, 2, and 4, and a depth of 2.5 m at Site 3 since this site is slightly more shallow. Due to the overall shallow nature of the water column at Site 5, located in the small cove on the east side of Lake Yale, only values collected at a depth of 0.5 m are included on Figure 2-60.

Measured surface (0.5 m) pH values collected at Sites 1-4 were virtually identical during the 12-month field monitoring program, with measured pH values ranging from 7.5-9.1, with the most elevated pH values observed during the period from May-September 2015. The pH values in deeper portions of the water column were similar to values measured at the surface depths, with the exception of slightly lower pH values measured in the bottom samples collected at Site 3 on several occasions. A substantially lower surface pH was observed at Site 5, with measured values ranging from approximately 7.2-8.2.

Measured conductivity values in Lake Yale were also relatively consistent for the surface values measured at Sites 1-4, with values ranging from approximately 380-420 μmho/cm. The most elevated values of specific conductivity in Lake Yale were observed during late-fall and early-winter conditions. Measured conductivity values in deeper portions of the water column were similar at most sites to values measured at the surface, with the exception of Site 2 which exhibited bottom values both above and below values measured at the surface. With the exception of values measured from May-July 2015, conductivity values in the small cove at Site 5 were generally lower in value than values observed at the remaining sites in the main portion of the lake.

Measured dissolved oxygen concentrations were also similar between surface and bottom values at Sites 1-4, with the general exception of somewhat lower dissolved oxygen concentrations observed near the bottom at Site 3 on several occasions. In general, measured concentrations of dissolved oxygen at the top and near-bottom monitoring locations at Sites 1-4 exceeded the historical dissolved oxygen criterion of 5 mg/l throughout the field monitoring program, with the exception of several values collected near the bottom at Site 3. Slightly lower dissolved oxygen concentrations were observed at Site 3 throughout the field monitoring program, with 5 of the 12 monitoring events exhibiting surface dissolved oxygen concentrations less than 5 mg/l at this site.

Dissolved oxygen saturation values were also relatively similar between top and bottom measurements conducted at Sites 1-4. With the exception of a few bottom measurements collected at Site 3, both surface and bottom measurements collected at Sites 1-4 exceeded the minimum Class III criterion of 38% for dissolved oxygen saturation throughout the field monitoring program. Somewhat lower saturation values were observed at Site 5, with 3 of the 12 monitoring events exhibiting oxygen saturation values less than the Class III criterion.

Overall, field measured parameters in Lake Yale at Sites 1-4 appear to be relatively uniform between the sites within the main portion of the lake at both the surface and in deeper portions of the water column. However, water quality characteristics at Site 5 appear to be somewhat different than water quality measured in larger portions of Lake Yale, with an overall lower pH value, lower conductivity, and lower values for dissolved oxygen and dissolved oxygen saturation.

A graphical summary of temporal variability in Secchi disk depths in Lake Yale from March 2015-March 2016 is given on Figure 2-63. The most elevated Secchi disk depths in Lake Yale were observed during the initial field monitoring event in March 2015 where values at each of the monitoring sites were equal to or greater than 1.5 m. However, following this date, measured Secchi disk values typically ranged from approximately 0.5-0.7 m at most sites. Measured Secchi disk depths at Sites 1-4 were relatively consistent during the field monitoring program, with both lower and higher Secchi disk values measured at Site 5.

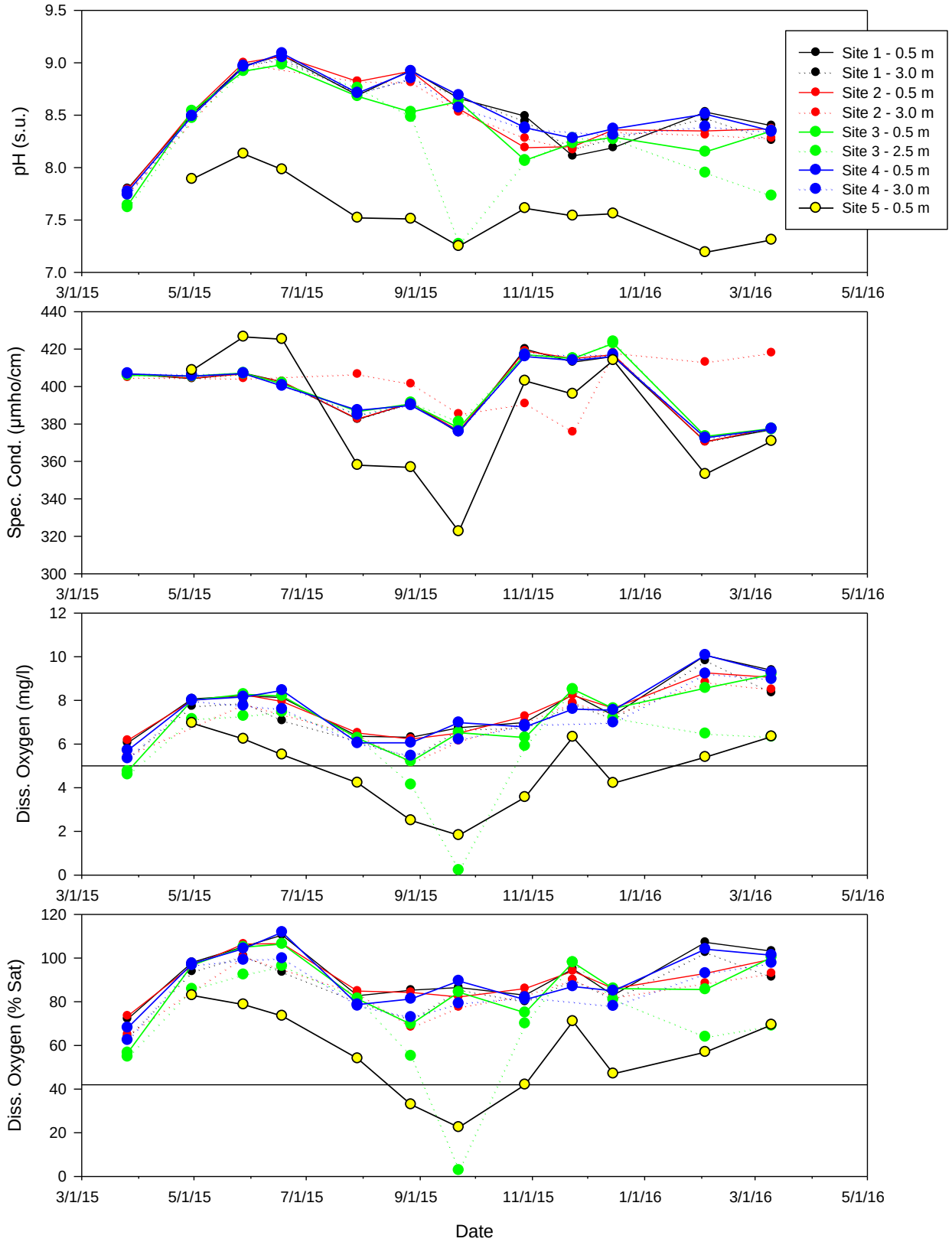


Figure 2-62. Temporal Variability in Measured Field Parameters in Lake Yale from March 2015-March 2016.

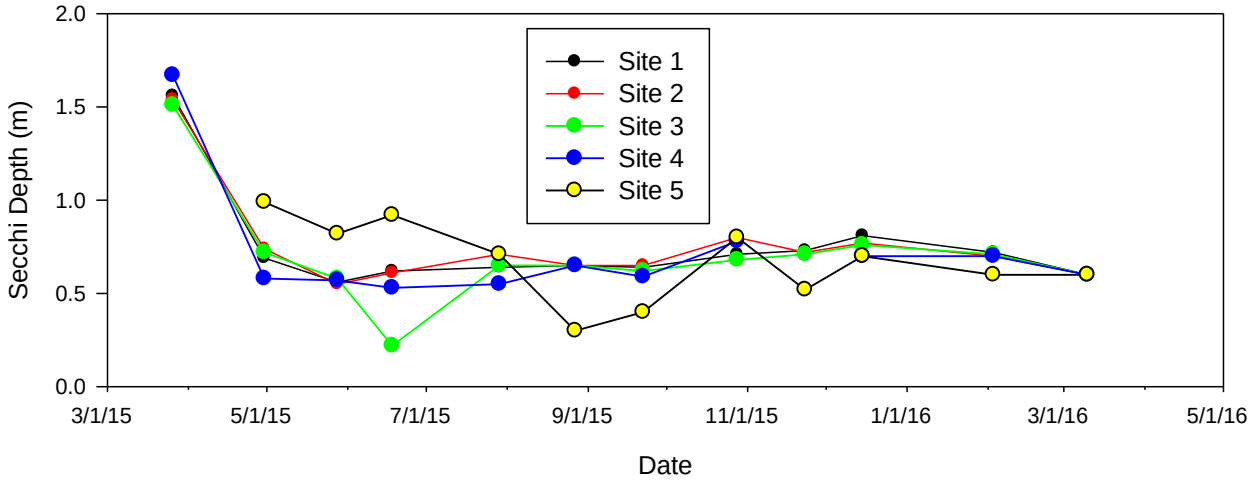


Figure 2-63. Temporal Variability in Measured Secchi Disk Depths in Trout Lake from March 2015-March 2016.

2.4.3.2 Water Quality Characteristics

A tabular summary of the mean characteristics of surface water samples collected in Lake Yale by ERD from March 2015-March 2016 is given on Table 2-24. Geometric mean values are provided for each of the laboratory measured parameters collected on surface and bottom samples collected at each of the monitoring sites. Surface samples were collected 0.5 m below the water surface, with bottom samples collected 0.5 m above the lake bottom.

In general, the water column in Lake Yale was well buffered, with mean surface alkalinity values ranging from 130-133 mg/l at monitoring Sites 1-4, and bottom mean values ranging from 131-133 mg/l. Alkalinity values in this range reflect relatively well buffered conditions. A slightly lower mean alkalinity value of 124 mg/l was observed at Site 5.

Measured concentrations of both ammonia and NO_x were extremely low in value in Lake Yale during the field monitoring program, with mean surface ammonia concentrations at Sites 1-4 ranging from 7-8 μg/l, and slightly higher values in bottom samples, with mean values ranging from 11-18 μg/l. A substantially higher ammonia concentration of 175 μg/l was measured at Site 5. Measured NO_x concentrations were also low in value, with mean surface concentrations ranging from 6-10 μg/l and bottom samples ranging from 6-7 μg/l. A similar geometric mean NO_x concentration of 5 μg/l was observed at Site 5. The data indicate that Lake Yale is relatively well mixed, both horizontally and vertically with respect to ammonia and NO_x.

Somewhat elevated levels of dissolved organic nitrogen were measured in Lake Yale, with mean surface concentrations ranging from 926-1,173 μg/l at Sites 1-4, and 1,087 μg/l at Site 5. Slightly lower mean dissolved organic nitrogen concentrations were observed in bottom samples at most sites compared with surface samples. Dissolved organic nitrogen comprised approximately 60% of the overall nitrogen present within the lake. Concentrations of dissolved organic nitrogen also appear to be relatively well distributed within Lake Yale.

TABLE 2-24

CHARACTERISTICS OF SURFACE WATER SAMPLES COLLECTED IN LAKE YALE FROM MARCH 2015-MARCH 2016

PARAMETER	UNITS	SITE 1		SITE 2		SITE 3		SITE 4		SITE 5
		Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Middle
Alkalinity	mg/l	132	132	133	133	132	131	130	131	124
Ammonia	μg/l	7	13	8	12	8	11	7	18	175
NO_x	μg/l	8	7	6	6	7	6	10	6	5
Diss. Organic N	μg/l	1,173	1,057	1,050	977	1,014	968	926	944	1,087
Particulate N	μg/l	605	556	596	602	568	595	533	671	654
Total N	μg/l	1,817	1,722	1,681	1,736	1,670	1,651	1,582	1,798	2,002
SRP	μg/l	6	6	5	5	5	5	7	6	6
Diss. Organic P	μg/l	4	5	8	6	12	11	8	12	10
Particulate P	μg/l	17	16	15	17	12	14	11	20	27
Total P	μg/l	29	29	31	30	31	33	27	41	45
Turbidity	NTU	5.1	5.6	5.1	5.5	5.5	6.2	4.9	6.4	3.3
Color	Pt-Co	27	27	25	24	28	25	24	24	63
TSS	mg/l	8.4	9.3	9.1	8.5	8.8	10.3	7.9	10.9	5.2
Chlorophyll-a	mg/m^3	16.5	--	16.0	--	20.0	--	13.6	--	18.2
TN/TP Ratio	--	62	--	55	--	54	--	59	--	44
TSI[1]	--	55	--	54	--	59	--	53	--	57

1. Based on chlorophyll-a only

Particulate nitrogen concentrations in Lake Yale comprised approximately one-third of the overall nitrogen measured within the lake, with geometric mean surface concentrations ranging from 533-605 μg/l, and bottom concentrations ranging from 556-671 μg/l. With the exception of Site 1, particulate nitrogen concentrations were greater in samples collected near the bottom than in samples collected near the surface. A similar particulate nitrogen concentration of 654 μg/l was measured at Site 5.

Overall, total nitrogen concentrations in Lake Yale appear to be moderately elevated in value, with overall geometric mean surface concentrations ranging from 1,582-1,817 μg/l and bottom samples ranging from 1,651-1,798 μg/l. A slightly greater overall mean value of 2,002 μg/l was measured at Site 5. Overall, total nitrogen in Lake Yale appears to be relatively evenly distributed, with only a slight variability between individual monitoring sites. The observed total nitrogen concentrations in Lake Yale are moderate to slightly elevated in value compared with concentrations commonly observed in Central Florida lakes.

Mean concentrations of total phosphorus in Lake Yale ranged from 27-31 μg/l in surface samples collected at Sites 1-4, with bottom measurements ranging from 29-41 μg/l. Two of the four sites exhibited higher total phosphorus concentrations in bottom samples compared with surface samples, while the remaining sites were either similar to or less than surface concentrations. The dominant phosphorus species in Lake Yale was particulate phosphorus which comprised approximately 50% of the total phosphorus measured during any given monitoring event. Dissolved organic phosphorus concentrations were generally low in value, with mean surface concentrations ranging from 4-12 μg/l and bottom samples ranging from 5-12 μg/l. Measured SRP concentrations in Lake Yale were moderate in value and relatively similar between surface and bottom measurements, with values ranging from approximately 5-7 μg/l. Phosphorus concentrations measured at Site 5 appeared to be similar to values measured in open portions of Lake Yale for SRP and dissolved organic phosphorus, with a somewhat higher value for particulate phosphorus and total phosphorus. Overall, the observed total phosphorus concentrations in Lake Yale are indicative of mesotrophic to eutrophic lake conditions.

Measured values for turbidity were generally low in value in Lake Yale, with mean measurements ranging from approximately 5-6 NTU, reflecting low values. Lake Yale also exhibited relatively low levels of color which appear to be similar in both surface and bottom samples, with mean values ranging from 24-28 Pt-Co units. A somewhat higher color value of 63 Pt-Co units was observed at Site 5.

Measured TSS concentrations in Lake Yale were moderate to slightly elevated in value, with mean surface measurements ranging from 7.9-9.1 mg/l and bottom measurements ranging from 8.5-10.9 mg/l within the main portion of the lake. Three of the four sites located in the main body of the lake exhibited higher TSS concentrations in bottom samples than observed in top samples. The TSS concentration observed at Site 5 appears to be similar to those observed in main portions of the lake.

A moderate degree of variability was observed in measured chlorophyll-a concentrations in Lake Yale, with mean values ranging from 13.6-20.0 mg/m^3. Measured chlorophyll-a concentrations at Sites 1 and 2, located in the west half of Lake Yale, were relatively similar in value. The most elevated mean chlorophyll-a value of 20 mg/m^3 was observed at Site 3 which is adjacent to the wetland inflow from Site 5. The lowest overall mean chlorophyll-a concentration was observed in the southeast portion of the lake. Chlorophyll-a concentrations at Site 5 appeared to be similar to those observed at the remaining sites.

Calculated TN/TP ratios in Lake Yale ranged from 44-62 at the five monitoring sites, suggesting severe phosphorus limitation within the lake. Mean calculated TSI values, based on chlorophyll-a, ranged from 53-59, reflecting mesotrophic conditions in Lake Yale on an annual average basis.

A graphical summary of temporal variability in measured values of alkalinity, color, turbidity, and TSS in Lake Yale samples collected from March 2015-March 2016 is given on Figure 2-64. Measured alkalinity values in Lake Yale ranged from approximately 120-150 mg/l during a majority of the collected samples, indicating well buffered conditions within the lake. No significant seasonal trend is apparent in measured alkalinity values.

Measured color concentrations in Lake Yale were generally low in value, with the vast majority of measurements less than approximately 40 Pt-Co units. Somewhat higher color values were observed at Site 5, with measurements exceeding 270 Pt-Co units on at least one occasion. No seasonal trend is apparent in color concentrations observed in the main portion of Lake Yale, with a peak in color observed during fall conditions at Site 5.

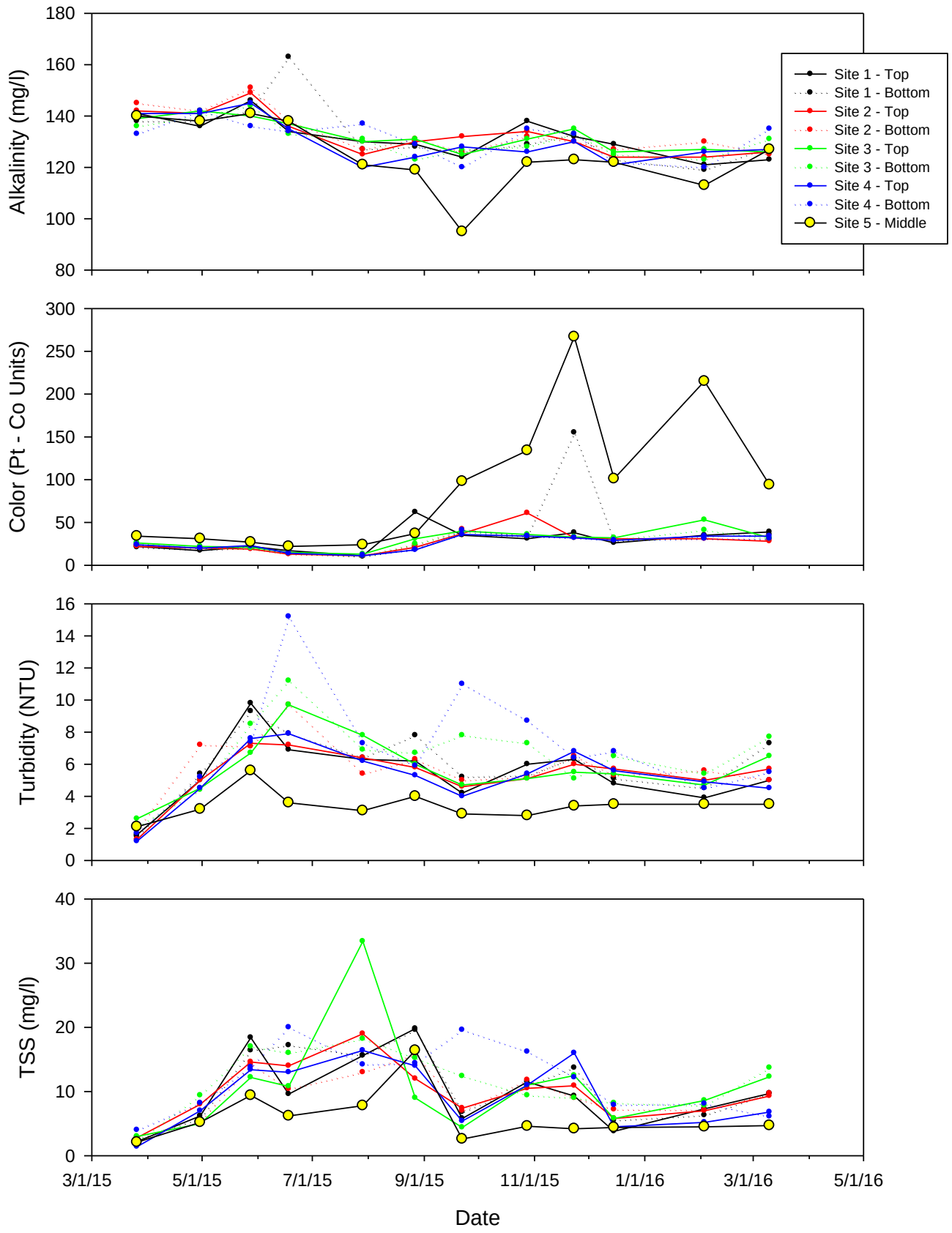


Figure 2-64. Temporal Variability in Measured Values for Alkalinity, Color, Turbidity, and TSS in Lake Yale Samples Collected from March 2015-March 2016.

Measured turbidity values in Lake Yale were generally low in value, ranging from approximately 1-10 NTU in most samples. A slight trend of increasing turbidity values was apparent during summer conditions, with lower values observed during remaining portions of the year. Measured turbidity values at Site 5 were generally lower than values measured in the main portion of Lake Yale.

Measured TSS concentrations in Lake Yale were highly variable, ranging from approximately 2 mg/l to more than 20 mg/l. A relatively close agreement is apparent between measured TSS concentrations within the main portion of the lake throughout the year, with a slight trend of more elevated TSS concentrations observed during summer conditions.

A graphical summary of temporal variability in measured concentrations of nitrogen species in Lake Yale is given on Figure 2-65. Surface measurements of ammonia in Lake Yale were generally low in value and relatively similar between monitoring Sites 1-4. More elevated concentrations of ammonia were observed in the bottom samples, particularly during the initial 2-3 months of the field monitoring program and during February 2016. Ammonia concentrations at Site 5 generally exceeded ammonia concentrations in main portions of Lake Yale during each of the individual monitoring events.

Somewhat elevated levels of NO_x were observed in Lake Yale during the first 2-3 initial monitoring events, particularly at Sites 3 and 4. However, beginning in August 2015, relatively low levels of NO_x were observed in both surface and bottom portions of the water column as well as at Site 5.

Dissolved organic nitrogen concentrations appear to be relatively similar in value between the individual monitoring sites for a given monitoring date, with peak values observed during late-fall and early-winter conditions, and slightly lower values during remaining portions of the year. A relatively close agreement was observed between measured dissolved organic nitrogen concentrations in surface and bottom samples. A similar pattern was also observed for particulate nitrogen which appeared to be relatively consistent in value throughout the field monitoring program, and between top and bottom samples.

Measured concentrations of total nitrogen in Lake Yale were moderate to elevated in value, ranging from approximately 1,000 μg/l to more than 2,500 μg/l. A relatively close agreement in measured total nitrogen concentrations was observed between the individual sites and between top and bottom samples during the majority of the monitoring events. Somewhat more elevated values for total nitrogen were observed at Site 5 during approximately half of the monitoring events.

A graphical summary of temporal variability in measured concentrations for phosphorus species in Lake Yale is given on Figure 2-66. Measured SRP concentrations in Lake Yale were highly variable, ranging from approximately 1 μg/l to more than 16 μg/l. The peak in SRP concentrations appears to have occurred during summer conditions, with lower measured concentrations during remaining portions of the year. Measured SRP concentrations appear to be relatively similar in surface samples collected at each of the five monitoring locations, with more elevated SRP values observed in bottom samples during some of the monitoring events.

Measured concentrations of dissolved organic phosphorus exhibited a moderate degree of variability, with measured values ranging from approximately 2 μg/l to more than 20 μg/l. A relatively close agreement was observed in measured concentrations of dissolved organic phosphorus between the individual monitoring sites on any given monitoring date, although the variability for this parameter is somewhat greater than that observed for SRP. No distinct seasonal trend is apparent for measured concentrations of dissolved organic phosphorus.

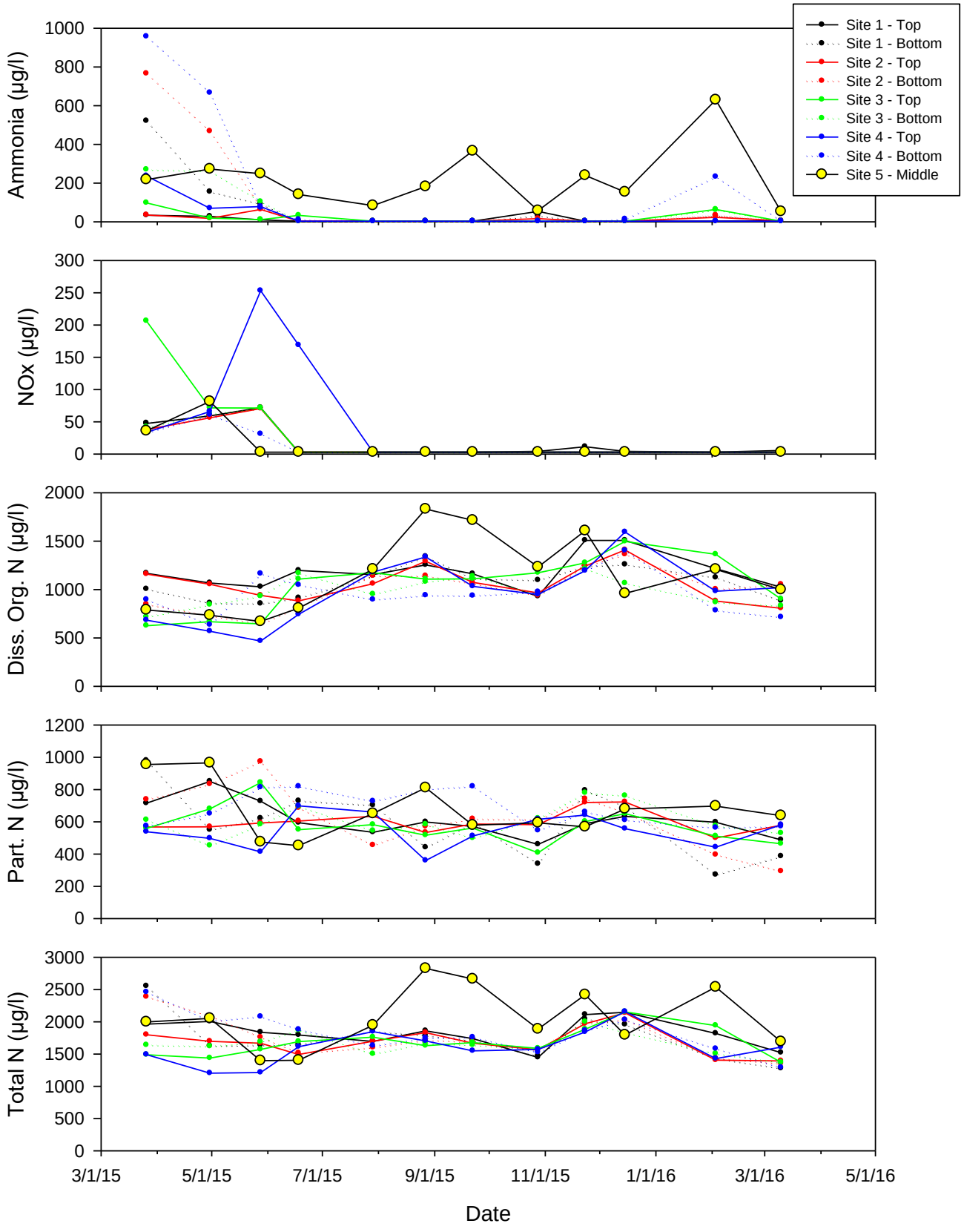


Figure 2-65. Temporal Variability in Measured Values for Nitrogen Species in Lake Yale Samples Collected from March 2015-March 2016.

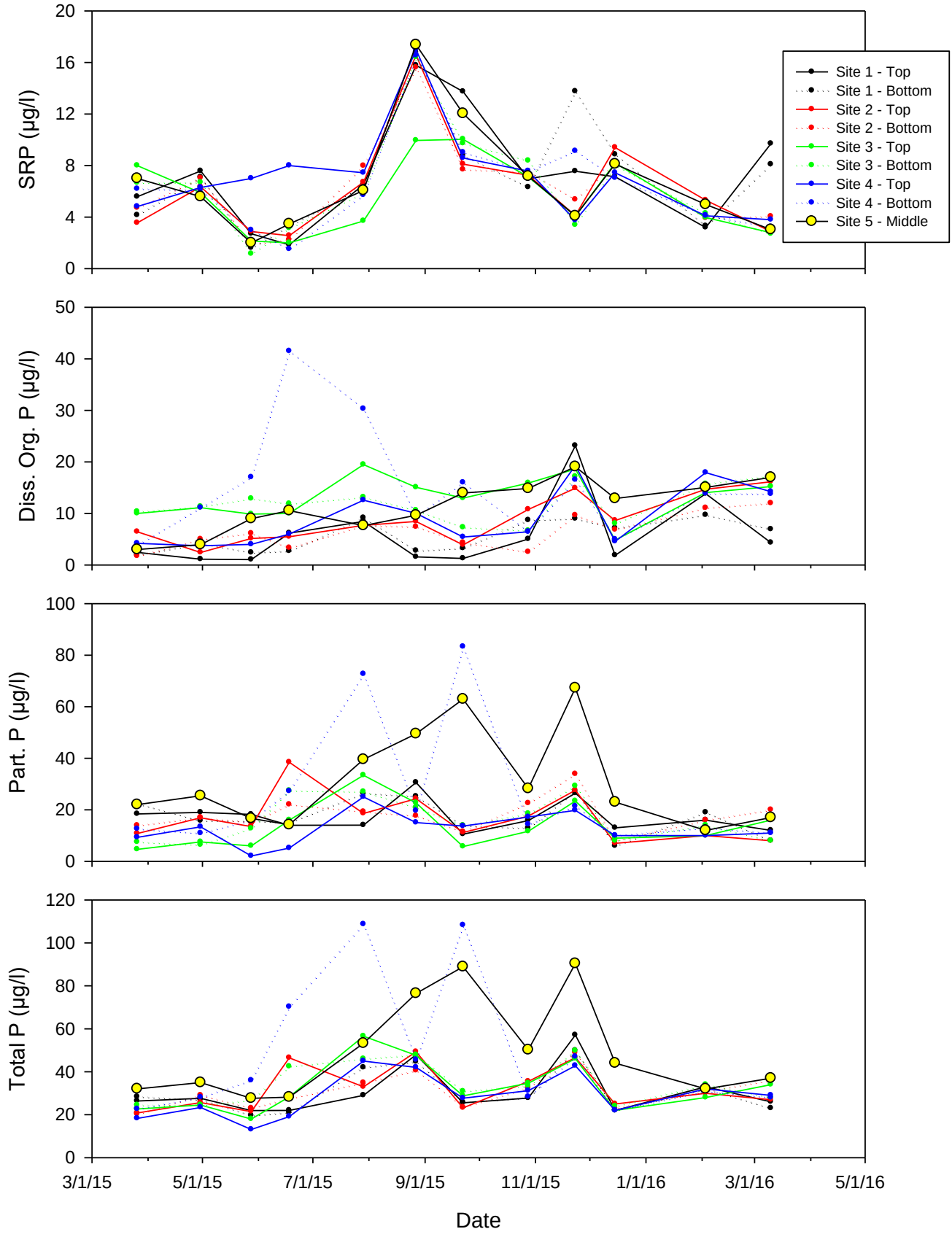


Figure 2-66. Temporal Variability in Measured Values for Phosphorus Species in Lake Yale Samples Collected from March 2015-March 2016.

Measured concentrations of particulate phosphorus in Lake Yale exhibit a trend similar to that observed for dissolved organic phosphorus, with relatively similar values measured between the individual monitoring sites on any given date. In general, measured particulate phosphorus concentrations at Site 5 appear to be somewhat greater than values measured at the remaining sites during a majority of the monitoring events. More elevated concentrations of particulate phosphorus were observed in bottom samples collected at Site 4 on multiple occasions.

Overall, total phosphorus concentrations in Lake Yale ranged from approximately 15 μg/l to more than 100 μg/l during the field monitoring program, although the vast majority of measured values appear to range from approximately 10-50 μg/l. A relatively close agreement was observed between phosphorus concentrations at the individual monitoring sites on any given monitoring date, with the exception of more elevated total phosphorus concentrations observed in samples collected near the bottom at Site 4. A slight seasonal pattern is apparent for total phosphorus concentrations in Lake Yale, with slightly higher concentrations during the fall and winter months which is often a sign of internal recycling. Phosphorus concentrations at Site 5 appear to be greater than values measured in open portions of Lake Yale during a majority of the monitoring events.

A graphical summary of temporal variability in measured values for chlorophyll-a, TN/TP ratio, and TSI value in Lake Yale during the field monitoring program is given in Figure 2-67. Measured chlorophyll-a values in Lake Yale were low to moderate in value during the field monitoring program, with virtually identical values measured at each of the monitoring sites within the main portion of the lake. A slight peak in chlorophyll-a concentrations is apparent during November 2015, with slightly lower values during remaining portions of the year. Somewhat higher chlorophyll-a measurements were observed at Site 5, particularly during August and November 2015.

Calculated TN/TP ratios in Lake Yale exhibited a relatively high degree of variability during the field monitoring program, although virtually all of the measured values indicate phosphorus-limited conditions. Calculated TN/TP ratios appear to be relatively similar at Site 5, as observed in main portions of the lake. Calculated TN/TP ratios appear to be lowest during summer and early-fall conditions, with more elevated values observed during remaining portions of the year.

Measured TSI values in Lake Yale ranged from oligotrophic to hypereutrophic throughout the field monitoring program. Oligotrophic characteristics were observed in Lake Yale during the initial two monitoring events, with mesotrophic and eutrophic conditions observed throughout the remainder of the field monitoring program. In general, TSI values measured at Site 5 appear to be similar to values measured in the open portion of Lake Yale, with the exception of hypereutrophic characteristics observed at Site 5 during August and November 2016.

2.5 Water Level Elevations and Control

2.5.1 Water Level Control

2.5.1.1 Trout Lake

Water level elevations in Trout Lake are controlled primarily by the free-flowing hydrologic connection to Lake Eustis (Figure 1-2). Trout Lake is connected to Lake Eustis through a navigable canal, located on the southwest corner of the lake, which passes beneath US 19 through an 8-ft x 12-ft CBC, and this hydrologic connection maintains water level elevations in Trout Lake similar to elevations in Lake Eustis. A photograph of the Trout Lake outfall is given on Figure 2-68. There is no current staff gauge or water level recorder in Trout Lake to provide specific water elevation data for the lake. Although Trout Lake may stage slightly higher than Lake Eustis during periods of significant inflow to Trout Lake from the large contributing watershed, on an overall annual basis, water elevations in Trout Lake and Lake Eustis should be relatively similar. Therefore, for purposes of this evaluation, historical water level elevation data for Lake Eustis are provided and assumed to be similar to values in Trout Lake.

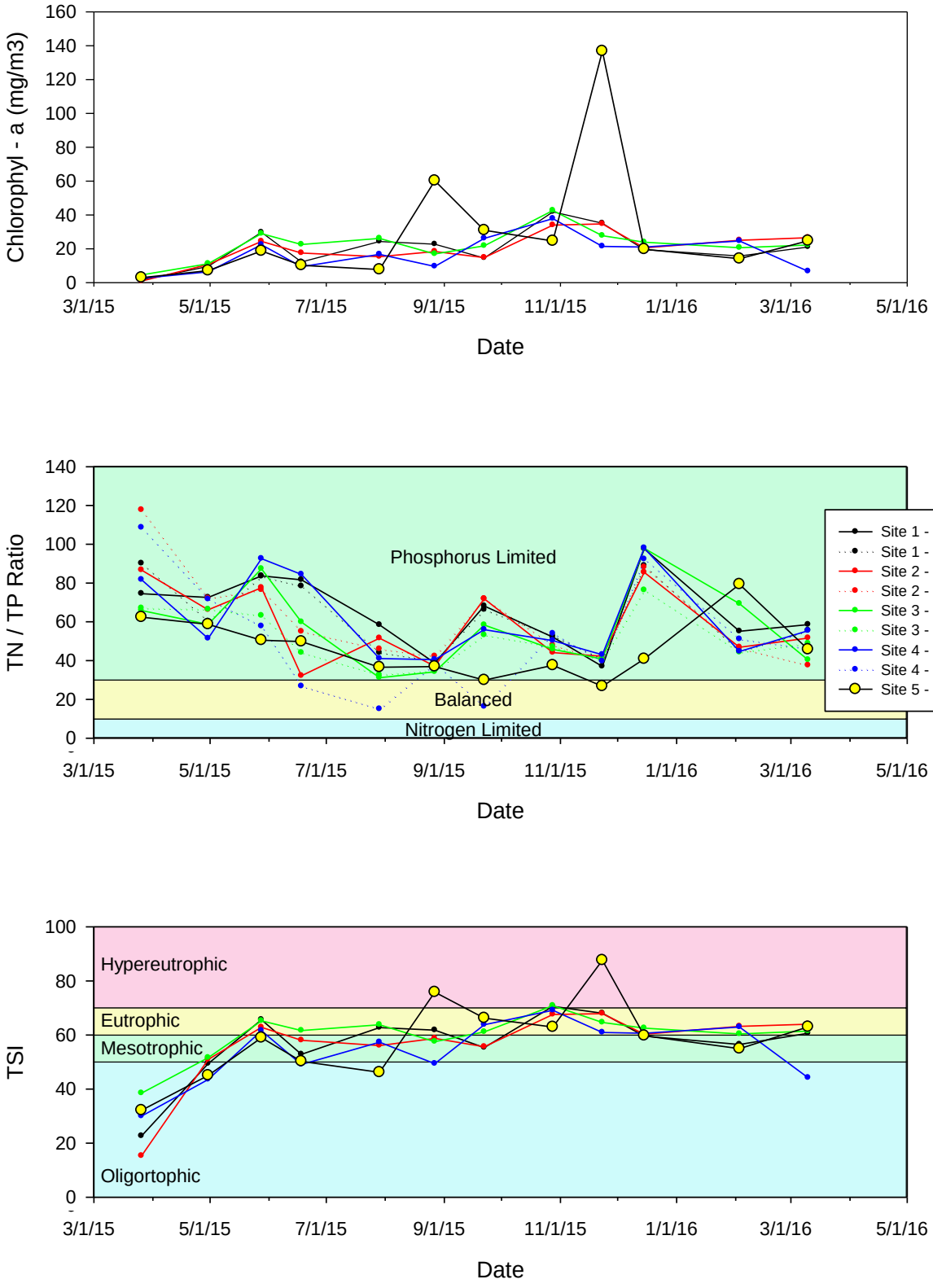
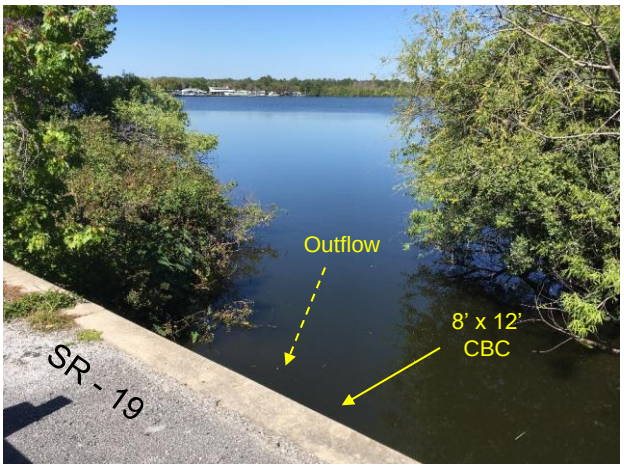
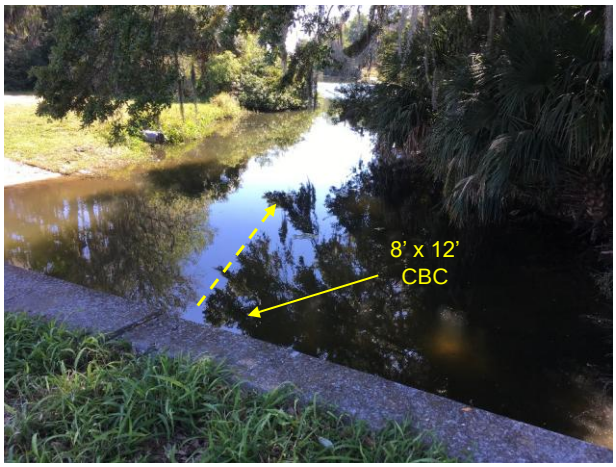


Figure 2-67. Temporal Variability in Measured Values Chlorophyll-a, TN/TP Ratio, and TSI Value in Lake Yale Samples Collected from March 2015-March 2016.



Trout Lake outfall structure – east side of SR 19



Outflow to Lake Eustis – west side of SR 19

Figure 2-68. Photographs of the Trout Lake Outfall Structure.

2.5.1.2 Lake Yale

Water level elevations in Lake Yale are regulated by a series of structures and culverts located along the Yale-Griffin Canal which conveys excess water from Lake Yale to downstream wetland areas and ultimately to Lake Griffin. An overview of the locations of water control structures for Lake Yale is given on Figure 2-69. An overview of control structures in the vicinity of CR 452 is given on Figure 2-70. According to LCWA, water levels are initially controlled by a concrete weir located in the Yale-Griffin Canal east of CR 452 although ERD did not visually observe the concrete weir during the field monitoring program.

The second and most significant structure which controls discharges from Lake Yale is a 24-inch HDPE in an earth berm approximately 50 ft east of CR 452. Photographs of the HDPE pipe are given on Figure 2-71. The current pipe is a replacement for a similar pipe that was washed out during high water conditions from the 2004 hurricane season. The invert of the HDPE culvert is thought to be approximately 58 ft which essentially establishes this as the control elevation for the lake.

The third structure which regulates water discharges from Lake Yale is the culvert crossing beneath CR 452. A photograph of the box culvert crossing is given on Figure 2-72. Water which discharges through the 24-inch HDPE is regulated by the invert elevation of this initial downstream culvert.

A final point of water level control for Lake Yale is the culvert beneath Emerald Road which passes through a conservation area owned by SJRWMD. After passing beneath Emerald Road, discharges from Lake Yale enter the east side of Lake Griffin. A photograph of the culvert crossing at Emerald Island Road is given on Figure 2-73.

Unfortunately, invert elevations do not appear to be available for any of the existing water control structures for Lake Yale. Anecdotal evidence appears to suggest that discharges from Lake Yale occur very infrequently, with no observed discharge from the lake in more than 10 years. According to Mr. Ron Hart with the Lake County Water Authority (LCWA), the invert elevations for the existing control structures make it extremely difficult for water to discharge back from Lake Griffin into Lake Yale, and it appears that the discharge from Lake Yale to Lake Griffin is predominantly a one-way path.

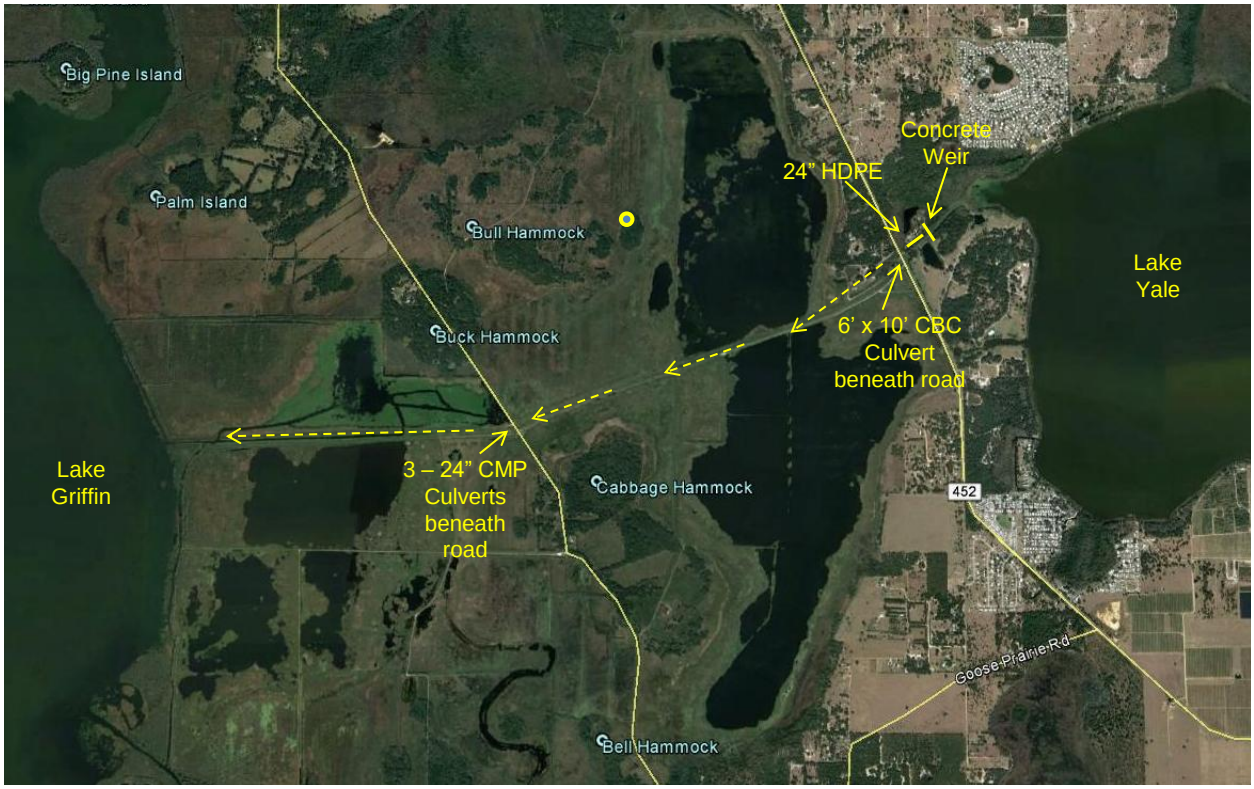


Figure 2-69. Lake Yale Water Control Structures.



Figure 2-70. Control Structures in the Vicinity of CR 452.



Lake Yale outfall structure



Outfall pipe through earthen berm



Outfall discharge through berm

Figure 2-71.

Photographs of the 24-inch
HDPE East of CR 452.



Figure 2-72.

Box Culvert
Crossing at SR 452.



Figure 2-73.

Yale-Griffin Canal Culvert Crossing at Emerald Road.

2.5.2 Water Level Elevations

Water level elevation data have been collected by SJRWMD in Lake Yale from 1959 to the present, and in Lake Eustis (surrogate for Trout Lake) from 1942 to the present. A graphical summary of historical water level elevations (NGVD29) in Lake Yale and Lake Eustis is given in Figure 2-74. The data plots for each lake begin in 1959 to provide similar time periods for comparison purposes. In general, water levels within the two lakes appear to mimic each other relatively closely in response to overall hydrologic and meteorological conditions within the general area.

A summary of measured minimum, maximum, and mean water elevations for Lake Eustis and Lake Yale is given in Table 2-25. Over the available period of record, water levels in Lake Yale have varied from 53.56-60.28 ft, a difference of approximately 6.7 ft, with an overall mean water elevation of 58.04 ft. The observed water level fluctuation in Lake Yale represents a relatively large range for a Central Florida lake.

TABLE 2-25

SUMMARY OF MEASURED WATER ELEVATION DATA FOR TROUT LAKE (LAKE EUSTIS) AND LAKE YALE (NGVD29 Datum)

LAKE	PERIOD OF RECORD	MINIMUM VALUE (ft)	MAXIMUM VALUE (ft)	MEAN VALUE (ft)	RANGE OF WATER LEVELS (ft)
Trout (Lake Eustis)	9/42-2/17	57.90	63.92	61.45	6.02
Yale	9/59-2/17	53.56	60.28	58.04	6.72
Hicks Ditch	12/97-12/16	60.12	65.75	63.22	5.63

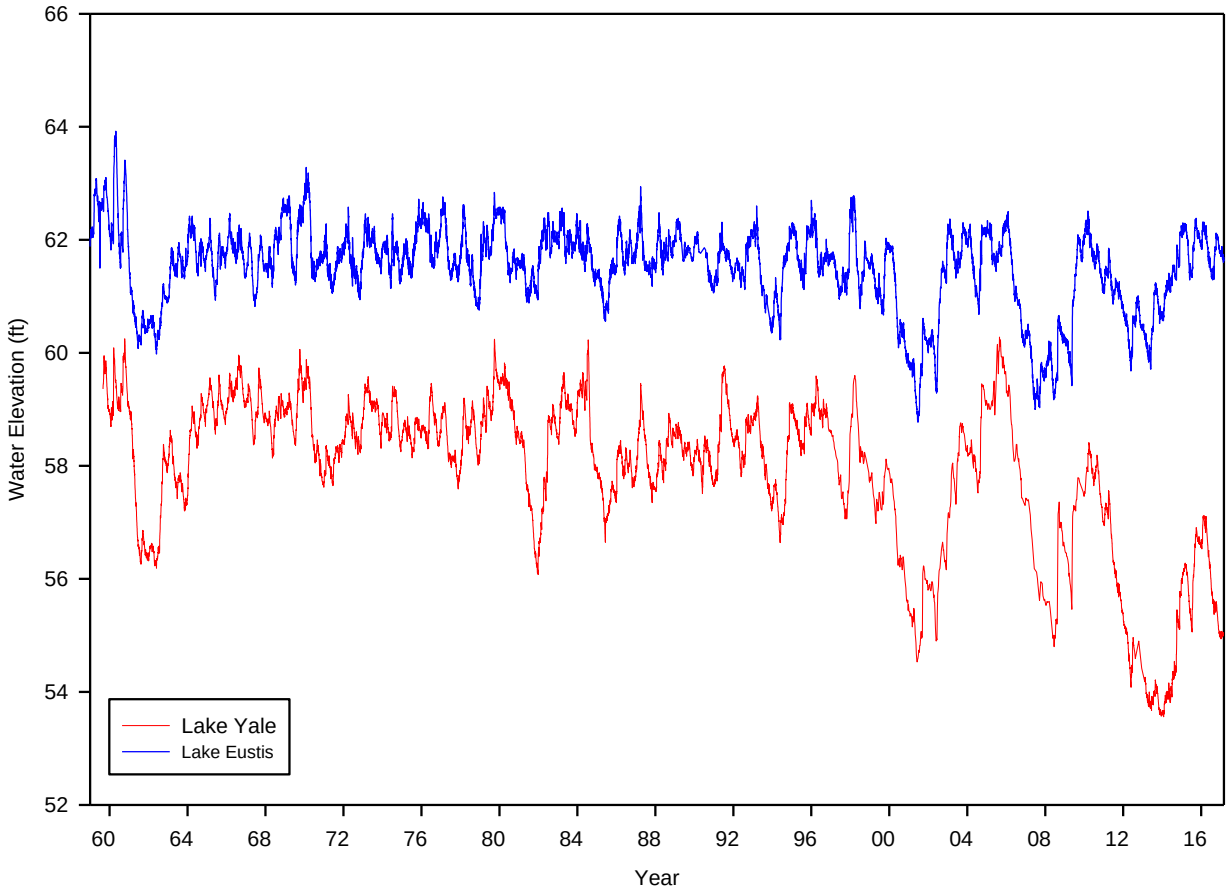


Figure 2-74. Measured Water Level Elevations in Lake Yale and Lake Eustis. (Source: SJRWMD)

Over the period from 1959-2017, water level elevations in Lake Eustis (as a surrogate for Trout Lake) have ranged from approximately 57.90-63.92 ft, a variation of approximately 6.02 ft. As indicated on Figure 2-74, water level fluctuations in Lake Eustis and Lake Yale appear to follow similar patterns, although the magnitude of the observed variability appears to be greater in Lake Yale than in Trout Lake (Lake Eustis), particularly from 2005 to the present.

SJRWMD also has a water level recording site on Hicks Ditch approximately 1.6 miles upstream from Trout Lake at the location indicated on Figure 2-75. Data are available at this site from 1998 to the present (January 2017), with readings collected on approximately a monthly basis.

A graphical comparison of water level elevations in Hicks Ditch and Lake Eustis, based upon the SJRWMD data, is given in Figure 2-76. In general, water level elevations in Hicks Ditch and in Lake Eustis appear to mirror each other relatively closely in response to regional hydrology and meteorological conditions, although the offset between the two water features may be variable over time. Water level elevations in Hicks Ditch have ranged from approximately 60.12-65.75 ft (NGVD29) over the available period of record, with an overall mean water surface elevation of 63.22 ft. The difference between the observed water level elevations in Hicks Ditch and in Lake Eustis (as surrogate for Trout Lake) provides the driving force for movement of water from the ditch into Trout Lake.



Figure 2-75. Hicks Ditch Hydro Monitoring Site.

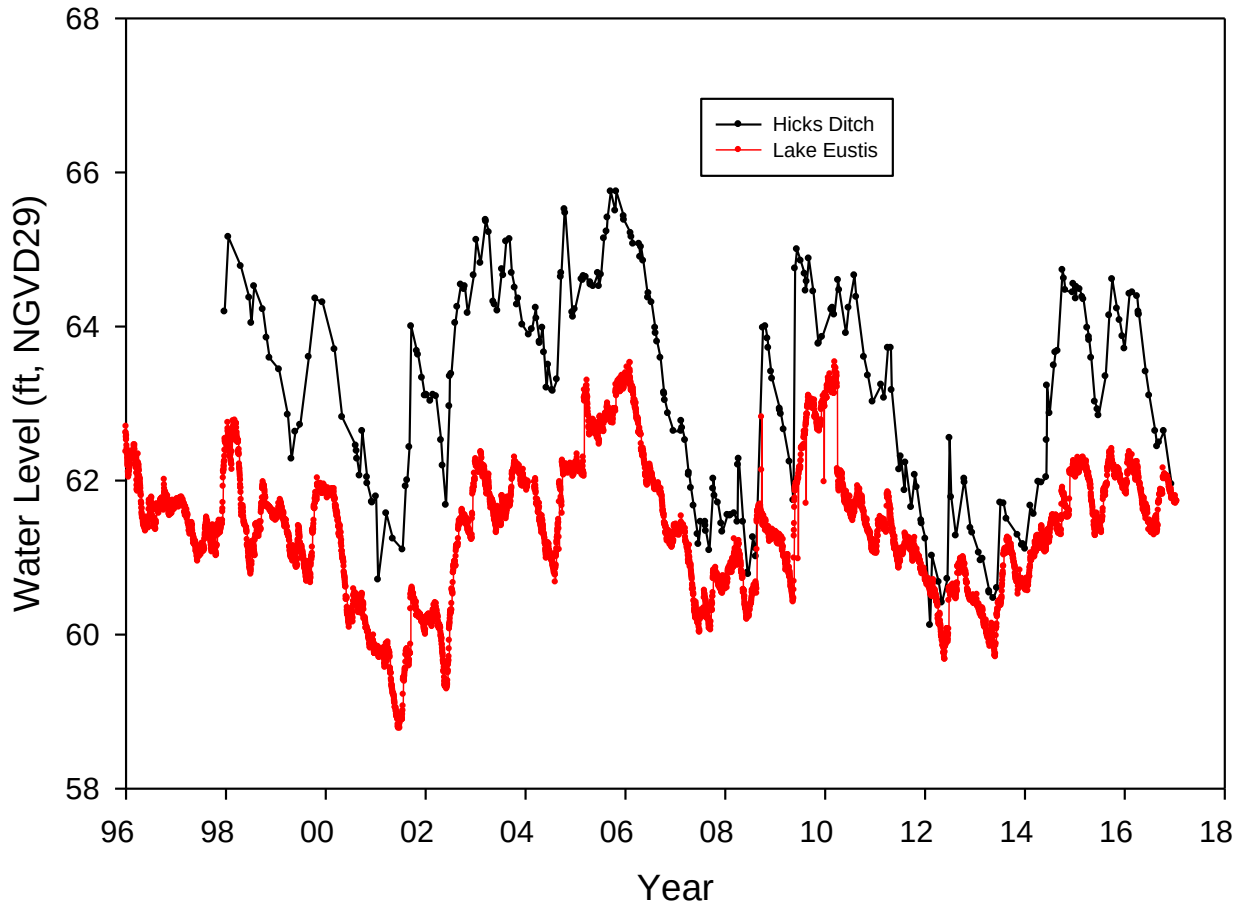


Figure 2-76. Comparison of Water Level Elevations in Lake Eustis and Hicks Ditch. (Source: SJRWMD)

As indicated in Table 2-25, the difference in mean water surface elevations at the Lake Eustis and Hicks Ditch SJRWMD monitoring sites (Figure 2-70) is approximately 1.84 ft. The SJRWMD monitoring site is approximately 8,660 ft from the point of inflow to Trout Lake, corresponding to an average hydraulic gradient of 0.0002 ft/ft which reflects a relatively mild slope.

2.5.3 Relationships Between Rainfall and Water Level

2.5.3.1 Lake Yale

A graphical summary of measured water level elevations and annual rainfall in Lake Yale from 1959-2016 is given on Figure 2-77. Water level data were obtained from the historical water level measurements summarized in Figure 2-74, with annual rainfall data based upon measurements collected at the Lisbon Meteorological Site which is located approximately mid-way between Lakes Yale, Griffin, and Eustis. A relatively good correlation appears to exist between annual rainfall and water level in Lake Yale, with increases and decreases in water level elevations in Lake Yale generally following annual rainfall patterns.

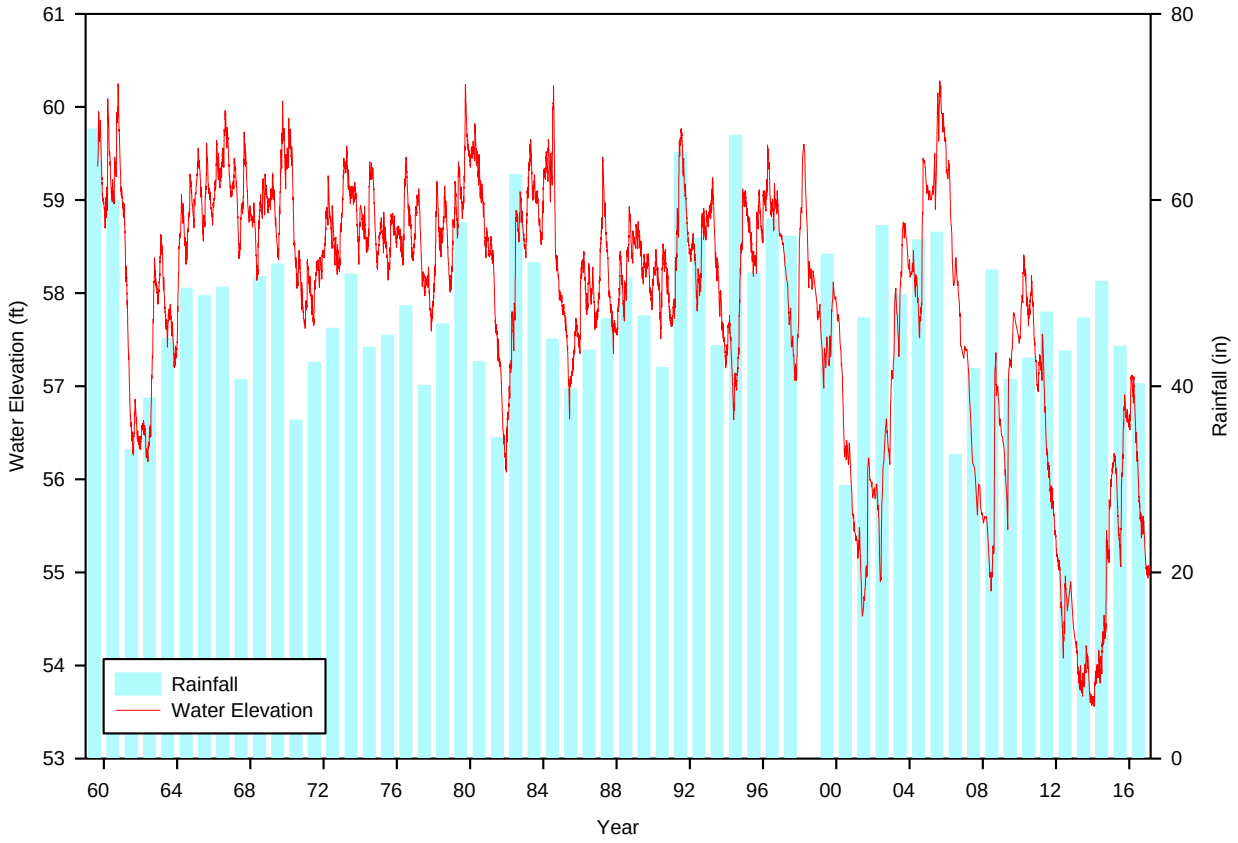


Figure 2-77. Measured Water Elevations and Annual Rainfall for Lake Yale from 1959-2016.

A supplemental analysis was conducted to evaluate changes in monthly stage elevations in Lake Yale as a function of monthly rainfall. Changes in water stage in Lake Yale were calculated for each monthly period from 1959-2017 by subtracting the ending monthly water elevation from the beginning water level elevation for each month during the 57-year period. This value was then paired with the monthly recorded rainfall at the Lisbon monitoring site for each monthly period, resulting in approximately 690 paired values of changes in stage elevations and monthly rainfall.

A scatter diagram of changes in monthly stage elevations in Lake Yale as a function of monthly rainfall is given on Figure 2-78. The data appear to exhibit a general upward trend for changes in water elevation with increasing rainfall amounts. A best fit regression line was calculated for the scatter points which is indicated by the dashed red line. The relationship between changes in water elevation and rainfall is highly significant at more than a 99.99% level of confidence. Based upon the calculated r-square value, rainfall appears to explain approximately 57% of the observed variability in water level elevations from 1959-2016.

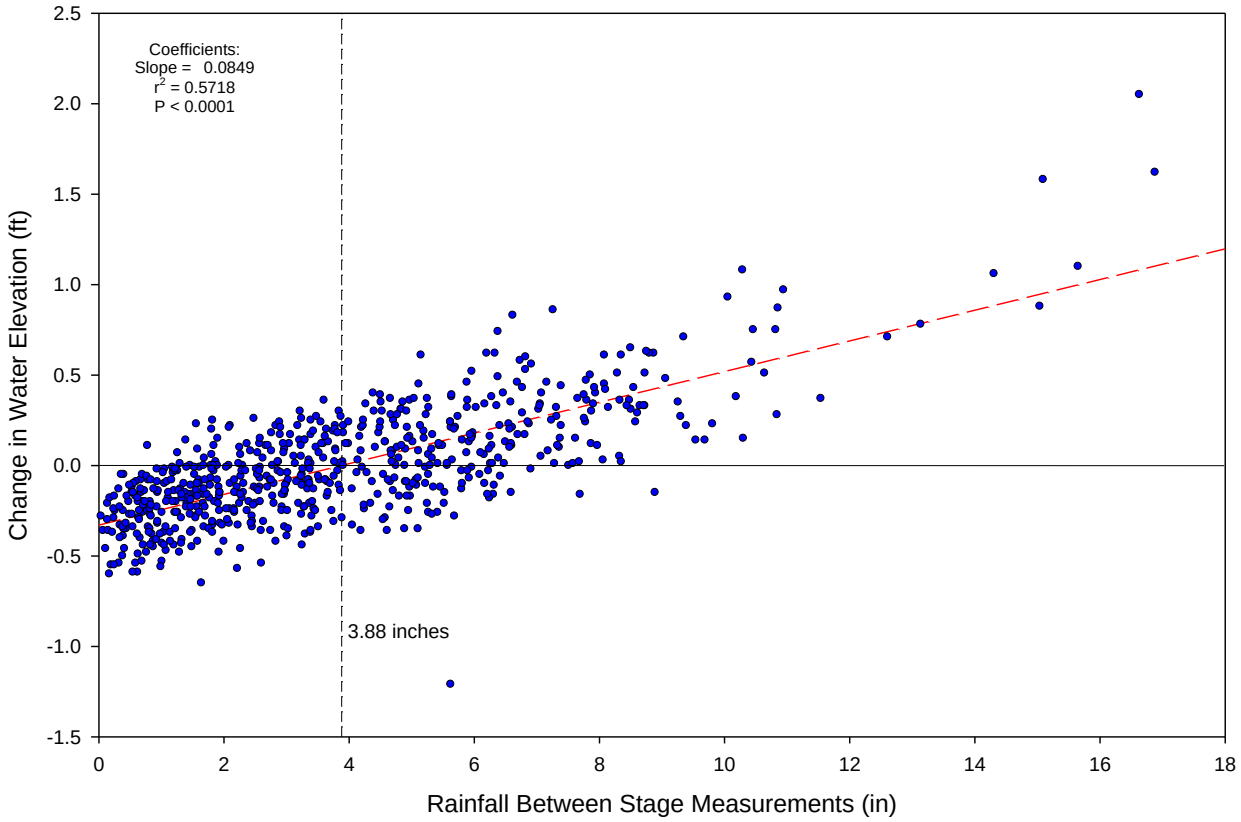


Figure 2-78. Changes in Monthly Stage Elevations in Lake Yale as a Function of Monthly Rainfall.

An additional vertical line was added to Figure 2-78 to indicate the point at which the regression line crosses the zero change in elevation line on the Y-axis. The monthly rainfall depth corresponding to the zero value on the Y-axis reflects the minimum monthly rainfall necessary to maintain a stable water level elevation in Lake Yale. The regression line crosses the zero line at approximately 3.88 inches per month, which is equivalent to 46.6 inches of rainfall on an annual basis. These data suggest that a minimum annual rainfall of approximately 46.6 inches is necessary to maintain water levels in Lake Yale, with decreases in water level elevations occurring at lower rainfall depths and increases in water level occurring at higher rainfall depths.

A summary of measured annual rainfall at the Lisbon meteorological monitoring station from 2000-2016 is given on Table 2-26. From 2000-2016, measured annual rainfall amounts at the Lisbon site ranged from 29.26-57.19 inches, with an overall average value of 45.93 inches per year from 2000-2016. Deficit/surplus values are calculated for each year based upon the difference between the measured annual rainfall depth and the minimum rainfall of 46.6 inches per year required to maintain constant water levels in Lake Yale. Over the period from 2000-2016, a deficit of 0.67 inches of rainfall occurred, indicating insufficient rainfall to maintain a constant water level in Lake Yale over this period. However, over the period from 2010-2016, the rainfall deficit increases to 8.60 inches which is substantially lower than the minimum rainfall necessary to maintain constant water levels. The effects of this decrease in rainfall are apparent on Figure 2-77, particularly over the period from 2010-2016. The analysis provided in Table 2-26 suggests that rainfall in recent years has been insufficient to maintain constant water levels in Lake Yale, resulting in an overall decline in water level.

TABLE 2-26

RAINFALL SUMMARY FOR THE LISBON METEOROLOGICAL SITE FROM 2000-2016

YEAR	RAINFALL (inches)	DEFICIT/ SURPLUS (inches)	YEAR	RAINFALL (inches)	DEFICIT/ SURPLUS (inches)
2000	29.26	-17.34	2009	40.71	-5.89
2001	47.30	0.70	2010	42.97	-3.63
2002	57.19	10.59	2011	47.90	1.30
2003	49.77	3.17	2012	43.74	-2.86
2004	55.67	9.07	2013	47.28	0.68
2005	56.48	9.88	2014	51.22	4.62
2006	32.61	-13.99	2015	44.27	-2.33
2007	41.86	-4.74	2016	40.22	-6.38
2008	52.44	5.84	**Average:**	**45.93**	**-0.67**

2.5.3.2 Trout Lake

A graphical plot of measured water elevations and annual rainfall for Lake Eustis from 1959-2016 is given on Figure 2-79. Overall, the observed pattern in water level elevations in Lake Eustis, as a surrogate for Trout Lake, appears to be virtually identical to the water level elevations summarized in Figure 2-77 for Lake Yale, although the magnitude of the peaks and valleys in the elevation data for Lake Eustis are lower than observed for Lake Yale. Periods of historically low water level elevations in Lake Eustis were observed from 2001-2002, 2007-2009, and 2012-2013.

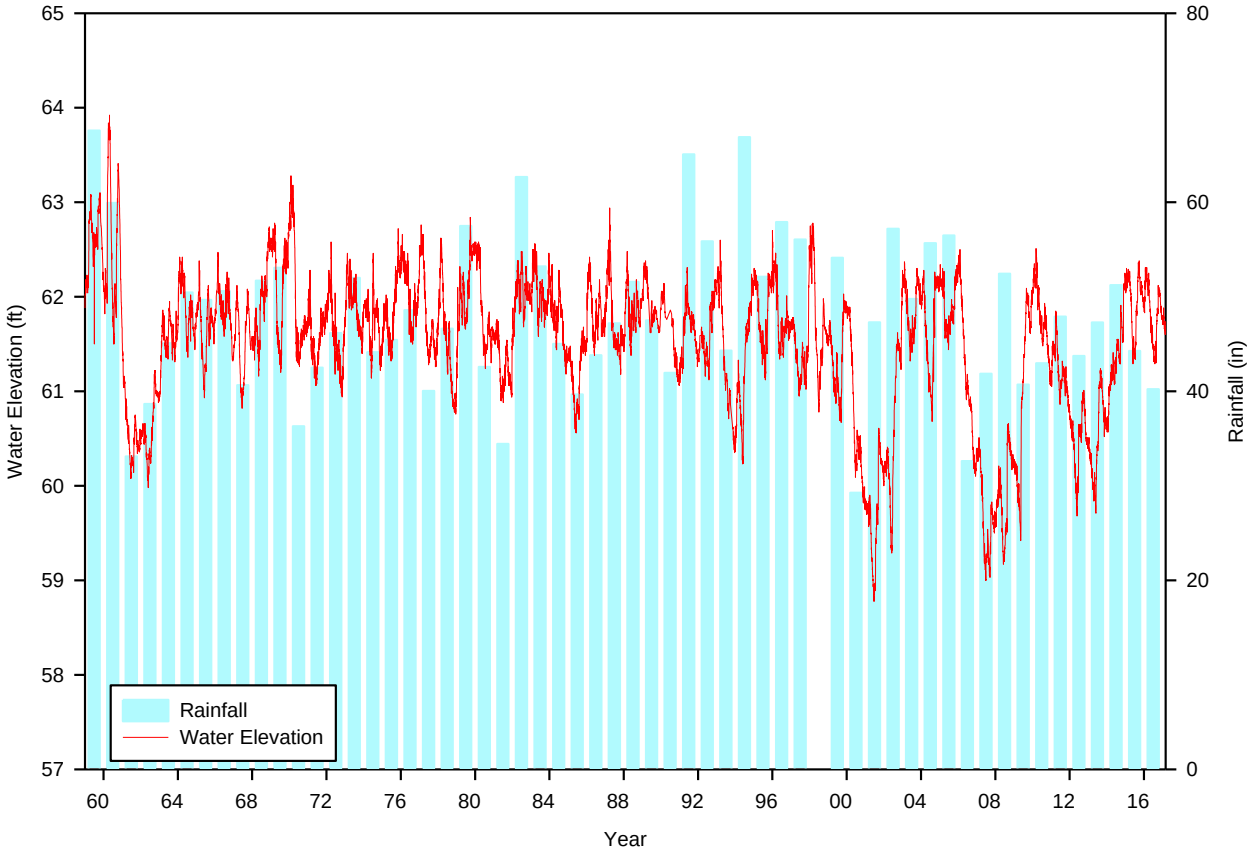


Figure 2-79. Measured Water Elevations and Annual Rainfall for Lake Eustis from 1959-2016.

2.5.4 Relationships Between Water Quality and Water Level

A supplemental analysis was conducted to evaluate relationships between water quality and water levels in Trout Lake and Lake Yale. The water quality data used in this analysis are the historical data presented in Appendix B for Trout Lake and in Appendix C for Lake Yale. Water level information for the two lakes was obtained from the data summarized in Table 2-68 for Lake Yale and Lake Eustis (as surrogate for Trout Lake). Approximate water surface elevations in Lake Yale and Lake Eustis were estimated for each sampling date contained in the historical data set. If a water elevation reading was conducted on the same date as the sampling event, then the measured water level within Lake Yale or Lake Eustis was assigned to the monitoring event conducted on that date. If water level elevation readings were not available for a given monitoring date, then a linear interpolation was conducted between the closest two water level measurements prior to and following the monitoring event to estimate the level on the monitoring date. Scatter plots were generated to evaluate relationships between water level elevations and significant trophic indicators, including total nitrogen, total phosphorus, and chlorophyll-a.

2.5.4.1 Lake Yale

A graphical summary of relationships between water level elevations and water quality in Lake Yale is given on Figure 2-80. Each of the three trophic state variables exhibits inverse relationships between concentration and water stage, with increases in water elevation in Lake Yale corresponding with decreases in measured values for each of the three parameters. Probability values (P values) are also provided for each of the three plots to quantify the significance between the two variables. Probability values equal to 0.05 or less are generally considered to indicate a statistically significant difference at a 95% level. The relationships between concentrations of total nitrogen and total phosphorus and lake stage are significant at a 99.99% level, with a 97.4% probability of a significant relationship between chlorophyll-a and water level elevation.

Although the observed relationships between lake stage and total nitrogen, total phosphorus, and chlorophyll-a are highly significant, variability in water level elevations in Lake Yale explain only a small proportion of the variability in measured concentrations observed for the three trophic state parameters. Based upon the r-square values provided on Figure 2-80, water level elevations explain approximately 12% of the observed variability in measured concentrations of total nitrogen in Lake Yale, 16% of the observed variability in total phosphorus concentrations, and only 3% of the observed variability in concentrations of chlorophyll-a.

The relationships on Figure 2-80 indicate that concentrations of the measured parameters decrease as water level elevations within Lake Yale increase. Increases in water level elevations are generally associated with significant regional rainfall and increased runoff inflows, and the decrease in concentrations observed during periods of higher water level elevations suggests that stormwater runoff is not the most significant variable impacting water quality characteristics in Lake Yale. The observed increases in concentrations with decreasing water depth for the three trophic state variables suggest an internal loading source may be present which becomes a more significant component in determining water column concentrations under low water levels than under high water level conditions where significant dilution may occur from other less concentrated sources. Overall, the relationships for Lake Yale summarized on Figure 2-77 suggest that internal sources may be more significant in determining water quality characteristics within the lake than inputs of stormwater runoff.

2.5.4.2 Trout Lake

A graphical summary of relationships between water level elevations and water quality characteristics in Trout Lake is given on Figure 2-81. Separate plots are provided to evaluate relationships between water level elevations and total nitrogen, total phosphorus, and chlorophyll-a. Similar to the trends observed previously in Lake Yale, each of the three trophic state variables exhibits an inverse relationship between water column concentration and water stage, with increases in water elevations in Trout Lake corresponding with decreases in measured values for each of the three parameters. The observed relationships between water stage and trophic state indicators are all significant at a 99.99% level. However, even though it appears that stage has a significant relationship with concentrations of total nitrogen, total phosphorus, and chlorophyll-a, the substantial amount of scatter in the data indicates that other additional variables may also be present which exhibit significant relationships with trophic state indicators.

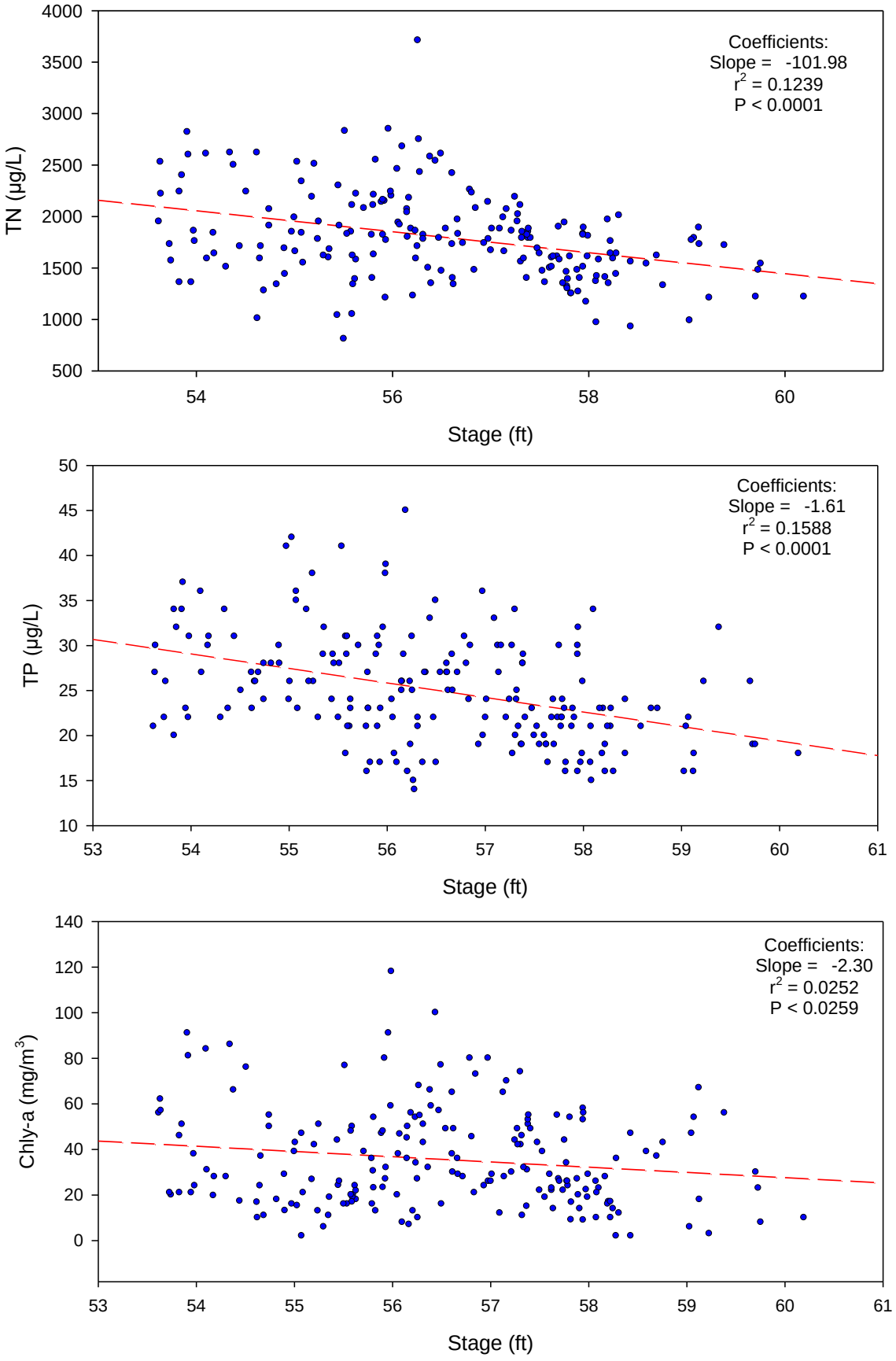
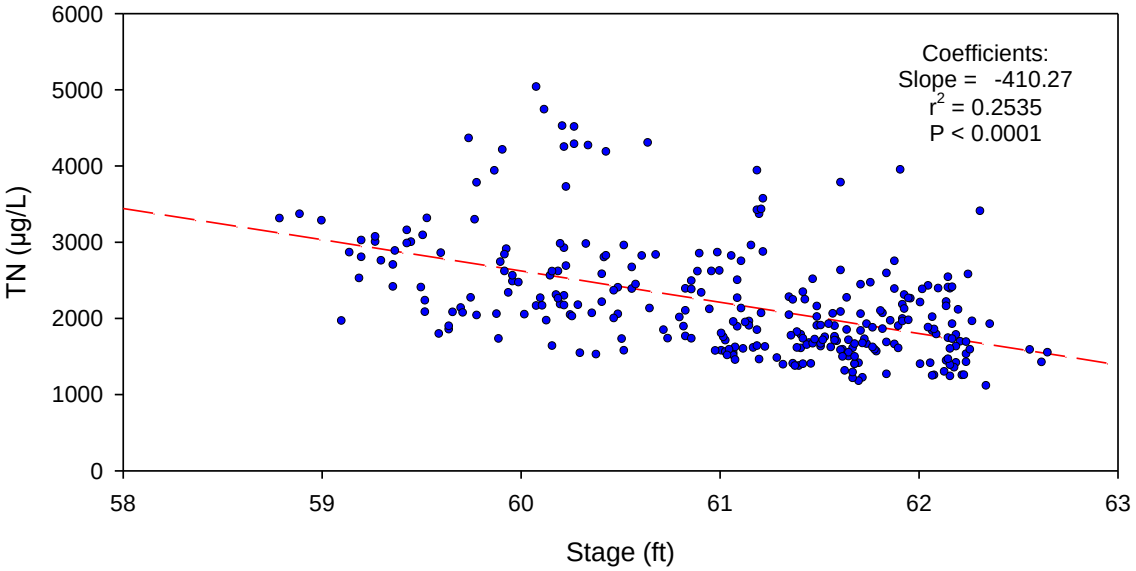
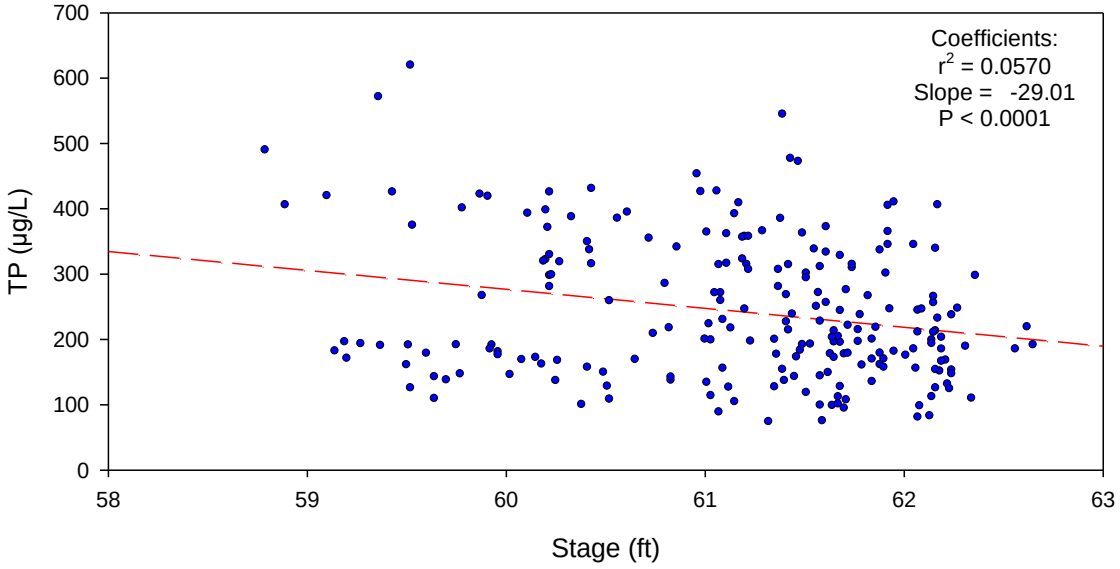


Figure 2-80. Relationships Between Lake Stage and Water Quality in Lake Yale.





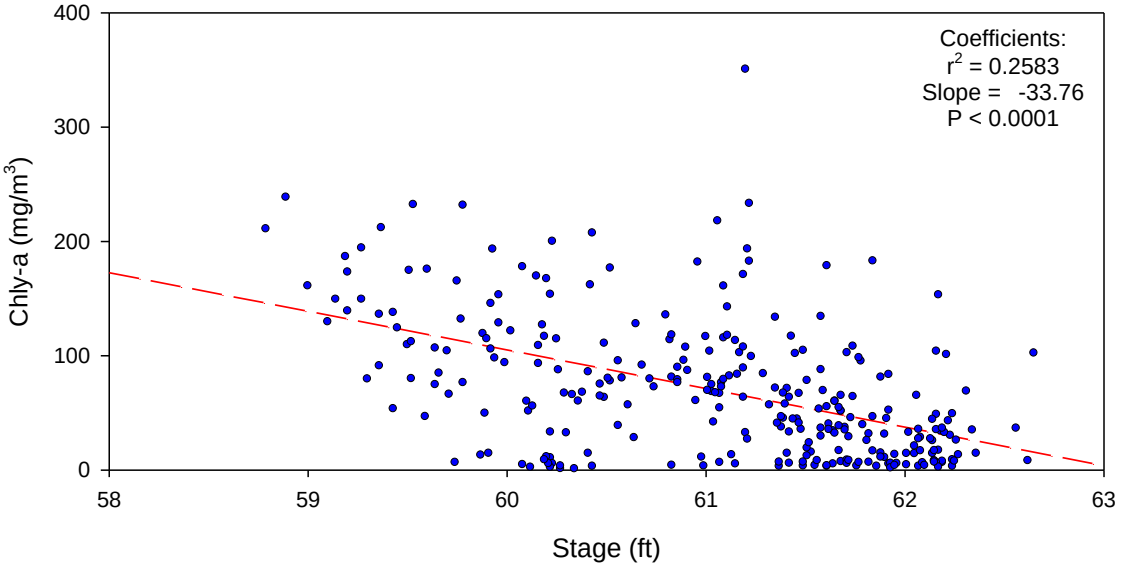


Figure 2-81. Relationships Between Lake Stage and Water Quality in Trout Lake.

Overall, the relationships between water stage and water quality in Trout Lake, summarized on Figure 2-81, suggest that internal sources of nitrogen and phosphorus may be more significant in determining water quality characteristics in Trout Lake that inputs of stormwater runoff. The observed decreases in concentrations at higher stage indicate that inputs of stormwater runoff may actually dilute water quality characteristics within Trout Lake, indicating that another significant source (such as internal recycling) is impacting water quality since nutrient concentrations in Trout Lake increase under low stage, and low rainfall, conditions. Based on the calculated r-square values, water level explains approximately 25% of the variability in total nitrogen concentrations, 6% of the variability in total phosphorus concentrations, and 26% of the variability in chlorophyll-a.

A graphical summary of the relationship between lake stage and color in Trout Lake is given on Figure 2-82. In contrast to the negative relationships observed between lake stage and significant trophic state variables (summarized in Figure 2-81), color appears to exhibit a positive relationship with lake stage in Trout Lake. This relationship suggests that increases in color occur at higher water stages during rainy conditions with large amounts of runoff inflow. Runoff appears to be a significant contributor to color in Trout Lake, presumably as a result of discharges from the large wetland areas located adjacent to Trout Lake. The observed increase in color is also likely related to the observed decrease in chlorophyll-a with lake stage since many color-causing compounds act as natural algaecides in lake systems. However, the observed reduction in chlorophyll-a with increasing lake stage is probably not related to the decreases in nutrient concentrations, since abundant nutrients are still present in Trout Lake at higher lake stage.

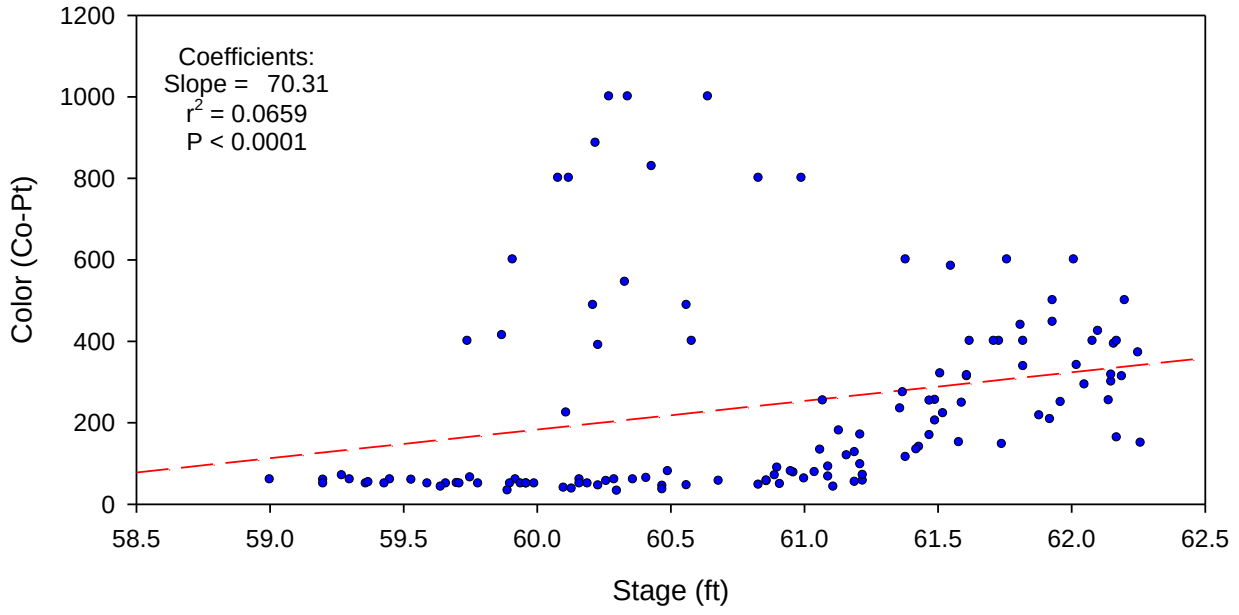


Figure 2-82. Relationships Between Lake Stage and Color in Trout Lake.

2.6 Aquatic Vegetation

2.6.1 Lake Yale

Prior to 1970, Lake Yale was an oligotrophic waterbody with a healthy community of fish and aquatic vegetation. Virtually all of the shoreline areas and most of the bottom portions of Lake Yale were covered with native aquatic vegetation. During the mid-1970s, Hydrilla began to appear in Lake Yale, and by the mid-1980s, Hydrilla had expanded to virtually all areas of the lake, topping out at the water surface over more than 50% of the lake area. During April 1984, the Florida Game and Fresh Water Fish Commission (FGFWFC) conducted a chemical application for treatment of Hydrilla which virtually eliminated Hydrilla from the lake. However, by 1987, approximately 100 acres of Hydrilla was noted in Lake Yale, increasing to 2,000 acres in 1990.

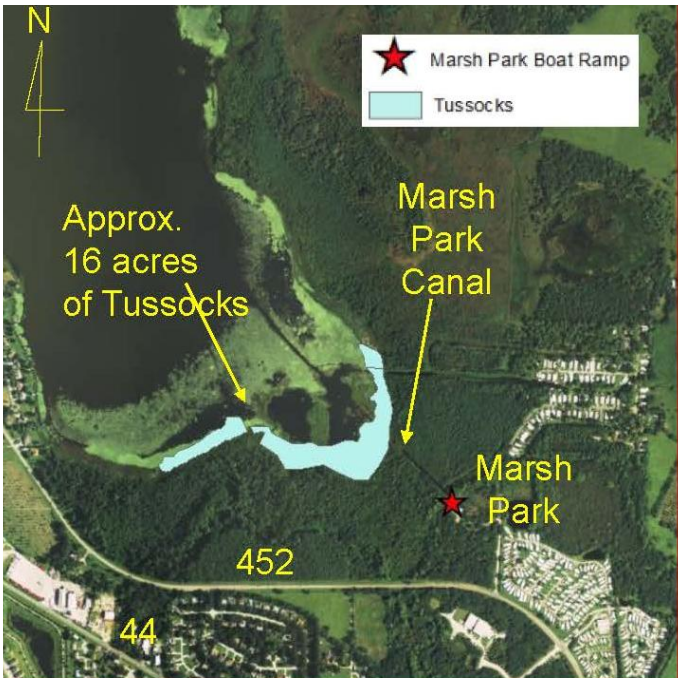
During July 1987, FGFWFC announced a 5-year experiment to put 4,000 triploid grass carp in Lake Yale to control the re-growth of Hydrilla following the herbicide application, with an intended stocking rate of 1 fish per acre. Additional grass carp were added to Lake Yale on multiple occasions following the initial introduction in 1987, with an estimate of more than 20,000 grass carp added to Lake Yale, resulting in an actual stocking rate of approximately 5 fish per acre. During 1990, FGFWFC estimated that approximately 10,000 grass carp remained in Lake Yale. Based on the 1990 estimate of approximately 10,000 grass carp, the remaining stocking rate within the lake at that time was approximately 2.5 fish per acre, a value similar to current recommendations by wildlife biologists.

During the early-1990s, the growth of Hydrilla began to expand in Lake Yale and more than half of the water column was infested with Hydrilla. Herbicide applications of Sonar were resumed in Lake Yale in December 1991, with a subsequent treatment in February 1992. Additional Sonar treatments were conducted in Lake Yale on multiple occasions through the mid-1990s.

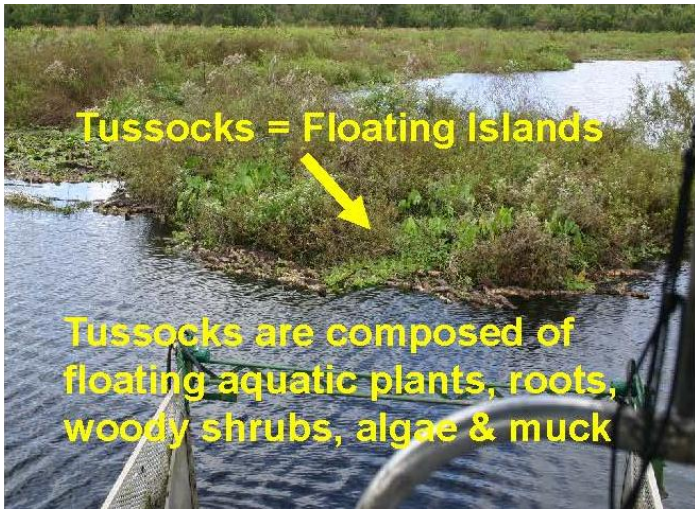
As discussed in Section 2.3.2, Lake Yale exhibited a significant trophic state shift during the mid- to late-1990s, with substantial and sudden increases in water column concentrations of total nitrogen, total phosphorus, and chlorophyll-a, with a subsequent decrease in Secchi disk depth as Lake Yale transitioned from a clear plant-dominated system to a turbid plankton-dominated system. The additional nutrients added to the lake by decomposition of decaying vegetation and excretion of plant nutrients by the grass carp were sufficient to increase water column concentrations of both total phosphorus and total nitrogen, resulting in a corresponding increase in chlorophyll-a and decrease in water column clarity. The substantial reduction in water column clarity minimized the growth of submerged vegetation within the lake, reducing the frequency of required herbicide applications. At this time, it appears that virtually all of the submerged aquatic vegetation in central portions of Lake Yale has been eliminated. No evidence of rooted submerged vegetation was observed in central portions of Lake Yale by ERD during the field monitoring program.

In recent years, Lake Yale has experienced a gradual increase in floating tussocks, particularly on the southeastern portion of the lake. Tussocks consist of floating islands of vegetation comprised of a combination of floating aquatic plants, root structures, algae, and sediments. Tussocks generally originate as areas of aquatic vegetation in shallow water which become buoyant and float when water levels increase. The presence of floating tussocks is detrimental to both recreation and wildlife. During August 2015, the Marsh Park Canal in the southeast lobe of Lake Yale became blocked with tussocks, and a mechanical removal was conducted from October-November 2015 in a partnership with LCWA and Lake County. By the summer of 2016, drifting tussocks had returned to Lake Yale, and a second removal project was planned for October 2016. However, this project was ultimately postponed as a result of restrictions on lake access and low water levels.

Photographs of typical floating tussocks in Lake Yale and the extent of tussock coverage are provided on Figure 2-83. The tussock coverage during 2016 was concentrated primarily in southeastern portions of Lake Yale adjacent to the Marsh Park Canal. Wind events were often sufficient to move the floating tussocks, blocking access into the lake.



Extent of tussock coverage in Lake Yale



Example of typical floating tussock in Lake Yale

Figure 2-83. Tussock Coverage in Lake Yale in 2016. (Source: LCWA)

Photographs of the tussock removal process during October-November 2015 are given on Figure 2-84. A permit was obtained from FWC to remove 2.6 acres of primrose willow islands and 1.2 acres of floating spatterdock and coontail. Tussock removal was conducted using a floating weed harvester with a moving conveyor system which collected the tussocks and placed them into a storage hopper within the harvester. The 2015 removal event resulted in a substantial enhancement in the open water area in southeast portions of Lake Yale.

With the exception of the areas of nuisance floating tussocks, Lake Yale currently contains an extensive and impressive assemblage of shoreline vegetation which surrounds virtually all portions of the lake. Photographs of existing shoreline vegetation in Lake Yale present during the field monitoring program are given on Figure 2-85. The littoral zone vegetation within the lake covers virtually all shoreline areas with the exception of a few vegetation-free shorelines adjacent to residential homes. The vegetation surrounding Lake Yale provides valuable habitat for aquatic organisms and juvenile fish.

The shallow cove area located on the east side of Lake Yale where surface water monitoring Site 5 was located contains extensive vegetation throughout a majority of the cove area, and fishermen were observed fishing around the perimeter of the vegetation in this area during virtually every field monitoring event.



Floating weed harvester used for tussock removal



Tussock growth prior to removal



Tussock harvesting operation



Open area in Lake Yale following tussock removal

Figure 2-84
. Tussock Removal from Lake Yale During October-November 2015.
(Source: LCWA)



Figure 2-85. Lake Yale Shoreline Vegetation.

2.6.2 Trout Lake

In contrast to the extensive littoral zone coverage present in Lake Yale, Trout Lake contains relatively little traditional littoral zone vegetation. The eastern two-thirds of Trout Lake are hydraulically connected to the adjacent hardwood wetlands, and the lake transitions into areas of cypress trees and other herbaceous wetland vegetation. No littoral zone vegetation is present adjacent to the Country Club Manor Mobile Home Park, and it appears that this area is maintained in a vegetation-free condition. Shoreline vegetation on the west end of the lake, adjacent to US 19, consists of woody and herbaceous vegetation (such as primrose willow) which extends a short distance into the lake. A limited amount of littoral zone vegetation is present adjacent to the residential areas located on the southwest portion of the lake, but overall, Trout Lake contains very little of the type of vegetation observed in Lake Yale.

SECTION 3

CHARACTERISTICS OF THE LAKE YALE AND TROUT LAKE DRAINAGE BASIN

Characteristics of the drainage basin areas for Lake Yale and Trout Lake are summarized in this section, including information on drainage basin delineations, land use characteristics, soil types, basin topography, governmental jurisdictions, stormwater treatment areas, and sewage disposal. A discussion of each of these elements is given in the following sections.

3.1 Watershed Characteristics

A delineation of contributing drainage basin areas to Lake Yale and Trout Lake was conducted by ERD as part of this project. Preliminary drainage basin boundaries were established based upon information contained in the SJRWMD GIS Quad Boundary Layer (2013 revision) which provides an overall delineation of the theoretical watershed areas for the two lakes. The SJRWMD basin boundaries were modified slightly by ERD, as appropriate, by reviewing one foot Lidar contour elevation maps (2008) obtained from Lake County and Marion County, combined with 2014 aerial photography for the drainage basin area, field reconnaissance, and observation of drainage patterns during significant rain events.

An overview of the drainage basin delineation for Lake Yale and Trout Lake is given on Figure 3-1, and reflects the modified SJRWMD outer basin boundary. The Lake Yale drainage basin extends more than 8 miles north and more than 6 miles northeast from the lake and includes portions of both Lake and Marion Counties. The Trout Lake drainage basin extends approximately 5 miles north from the lake, 4 miles east, and 3 miles south of Trout Lake. A summary of watershed areas for Lake Yale and Trout Lake is given in Table 3-1. The overall theoretical contributing watershed area to Lake Yale is 39,517 acres, with a theoretical watershed area for Trout Lake of 14,803 acres.

TABLE 3-1

SUMMARY OF THEORETICAL WATERSHED AREAS FOR LAKE YALE AND TROUT LAKE

LAKE	POTENTIAL WATERSHED AREA (acres)
Yale	39,517
Trout	14,803

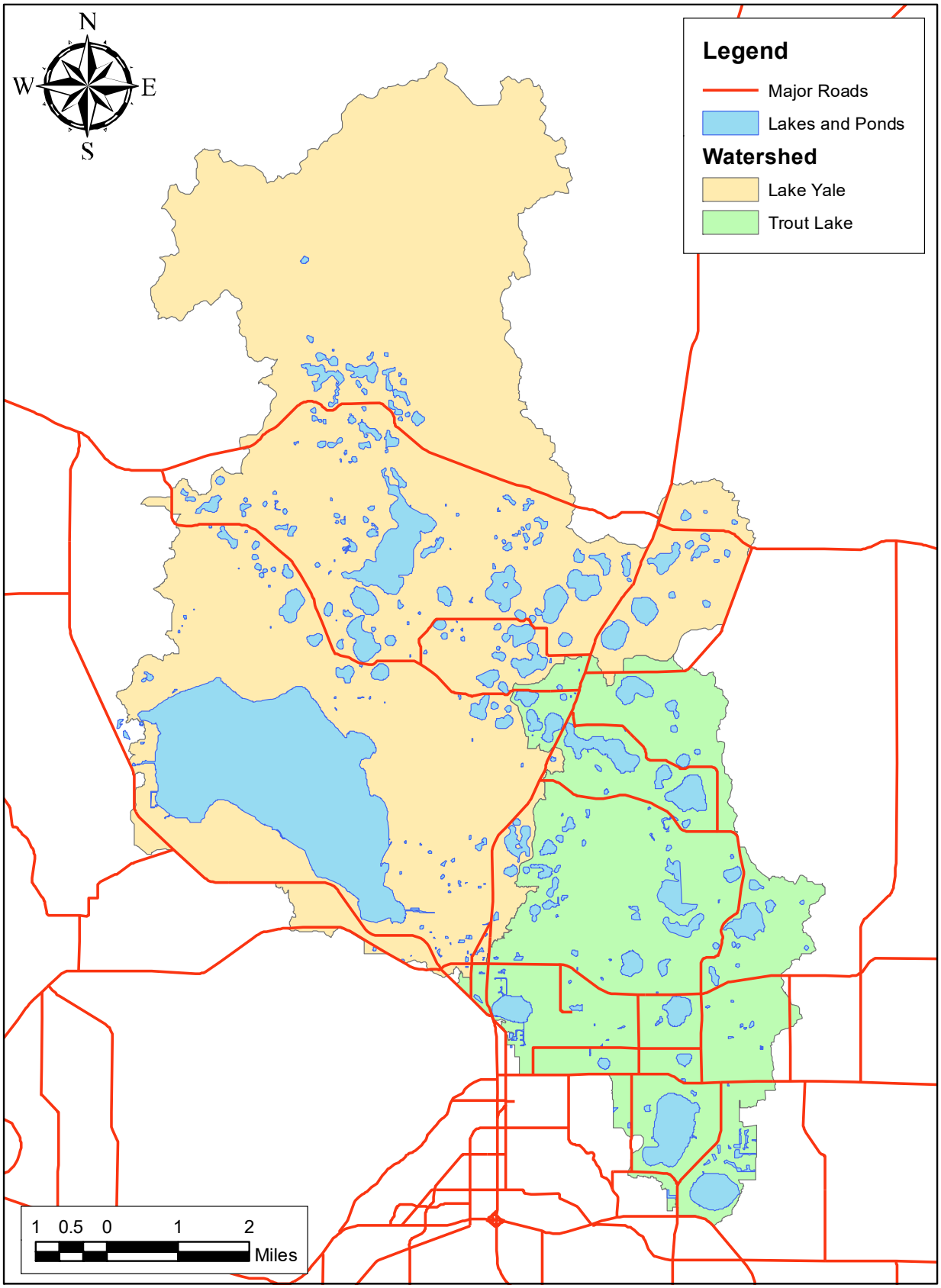


Figure 3-1. Drainage Basin Area Delineations for Lake Yale and Trout Lake.

The theoretical drainage basin areas for Lake Yale and Trout Lake contain significant internal storage in the form of depressional areas, lakes, and ponds which provide a large amount of water storage and retention, particularly in upstream portions of the two watersheds. Water elevations in many of these areas would have to increase by more than 7-10 ft before water would discharge to downstream waterbodies, and these areas have an extremely low probability of discharging to either Lake Yale or Trout Lake except under extreme low frequency flood event conditions. Drainage basin areas with significant internal storage were delineated by ERD and are indicated on Figure 3-2. Based upon this analysis, large portions of the northern and eastern theoretical drainage basin areas for Lake Yale and eastern portions of the theoretical basin areas for Trout Lake rarely, if ever, contribute significant runoff volume or loadings to downstream portions of the two watersheds. Therefore, these areas are considered to be "closed" basins and are not included as part of the drainage basin which contributes to the two lakes on a routine basis. The "closed" basin areas indicated on Figure 3-2 are excluded from further evaluations and discussions related to contributing drainage basin areas for Lake Yale and Trout Lake.

3.1.1 Lake Yale

An overview of delineated sub-basin areas discharging to Lake Yale, excluding the "closed" basin areas, is given on Figure 3-3. Forty-two (42) individual sub-basin areas were identified which discharge to Lake Yale through culverts, pipes, channels, or direct overland flow. A summary of individual sub-basin areas discharging to Lake Yale is given on Table 3-2. The delineated sub-basin areas range from 2.5-6,363 acres, with a total contributing drainage basin area of approximately 15,399.2 acres.

The largest contributing sub-basin area is identified as Lake Yale Slough which covers approximately 41.3% of the total basin area. This sub-basin area is located primarily on the north side of Lake Yale and consists of a series of interconnected lakes, shallow marshes, and wetlands. The second largest sub-basin is referred to as Lake Yale Wetland (LYW) which discharges into the east side of Lake Yale and comprises approximately 27.3% of the total contributing drainage basin area. The remaining contributing sub-basin areas are located immediately adjacent to Lake Yale and comprise <0.1-4.9% of the overall drainage basin area.

An overview of the Lake Yale Slough sub-basin area is given on Figure 3-4. This 6,362.6-acre area consists of a series of interconnected lakes, waterbodies, shallow marsh, and wetlands which ultimately discharge into the north side of Lake Yale. Most of the area within this sub-basin consists of natural areas and contains multiple significant water features referred to as Ella Lake, Holly Lake, Lake Elza, Lake Frances, and Bay Lake, along with multiple un-named water features. Arrows indicating directions of water movement are also provided on Figure 3-4. Extreme northern and eastern portions of the Lake Yale Slough sub-basin discharge ultimately to Ella Lake. The drainage pattern then continues in a westerly direction, ultimately entering a large wetland slough which discharges into the northwest side of Lake Yale. Approximately 1,137 acres of the western part of the Lake Yale Slough basin was dedicated as a Preserve by LCWA in 1994 for the purposes of protecting the water quality and wildlife habitat of Lake Yale and the expansive marsh. This area is currently referred to as the Sawgrass Island Preserve and provides a variety of natural experiences to visitors. The Preserve is centered on the north-south wetland areas in the western portion of the Slough, along with perimeter upland areas.

Minor sub-basin areas were also delineated within Lake Yale sub-basins to allow for attenuation mechanisms to be assigned for various waterbodies, wetlands, and depressional areas located within the overall sub-basin area. These individual minor sub-basins for the Lake Yale Slough sub-basin are illustrated on Figure 3-4 and are used in the ERD hydrologic model which is discussed in Section 4.

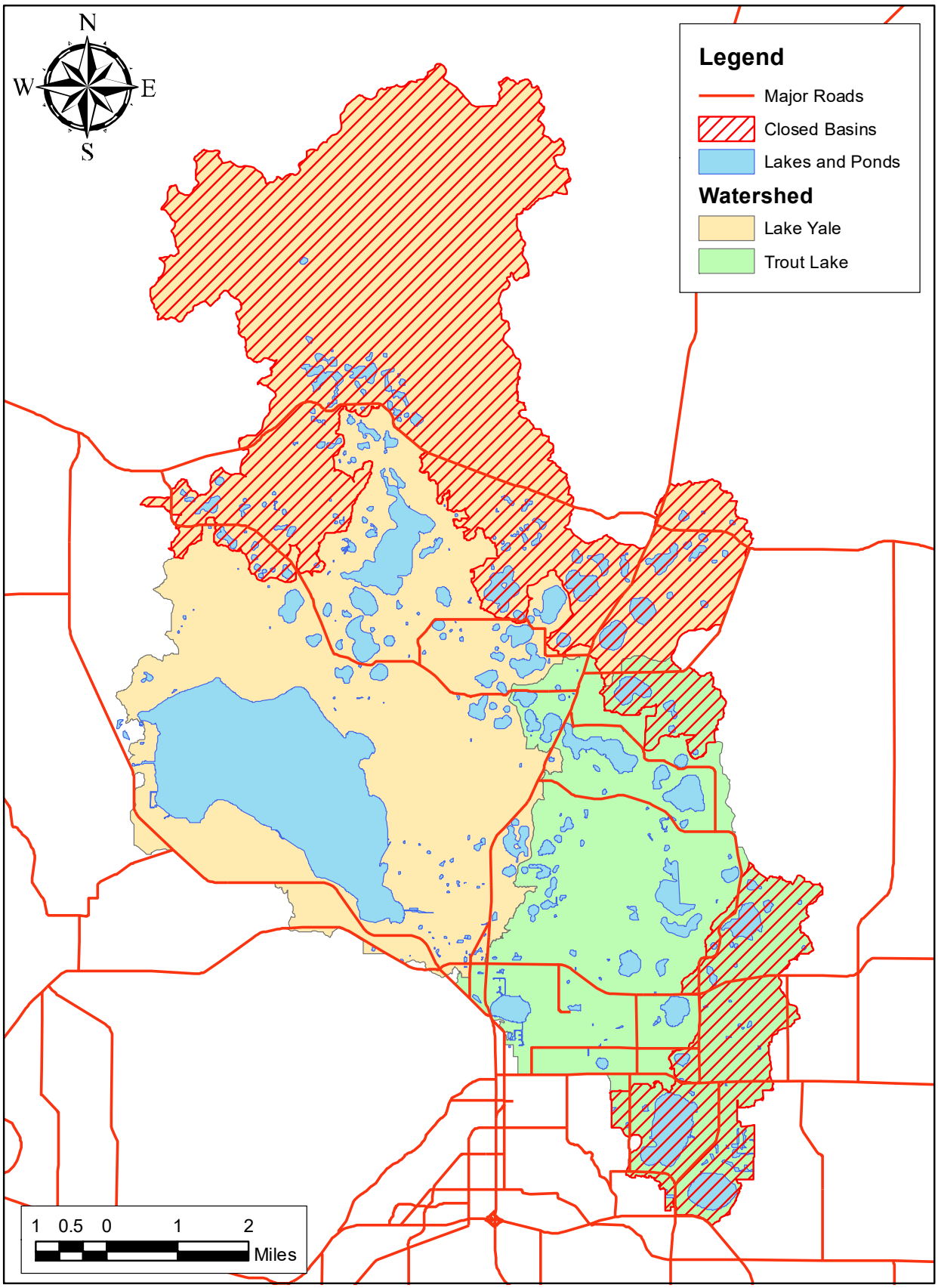


Figure 3-2. Contributing Drainage Basin Areas for Lake Yale and Trout Lake.

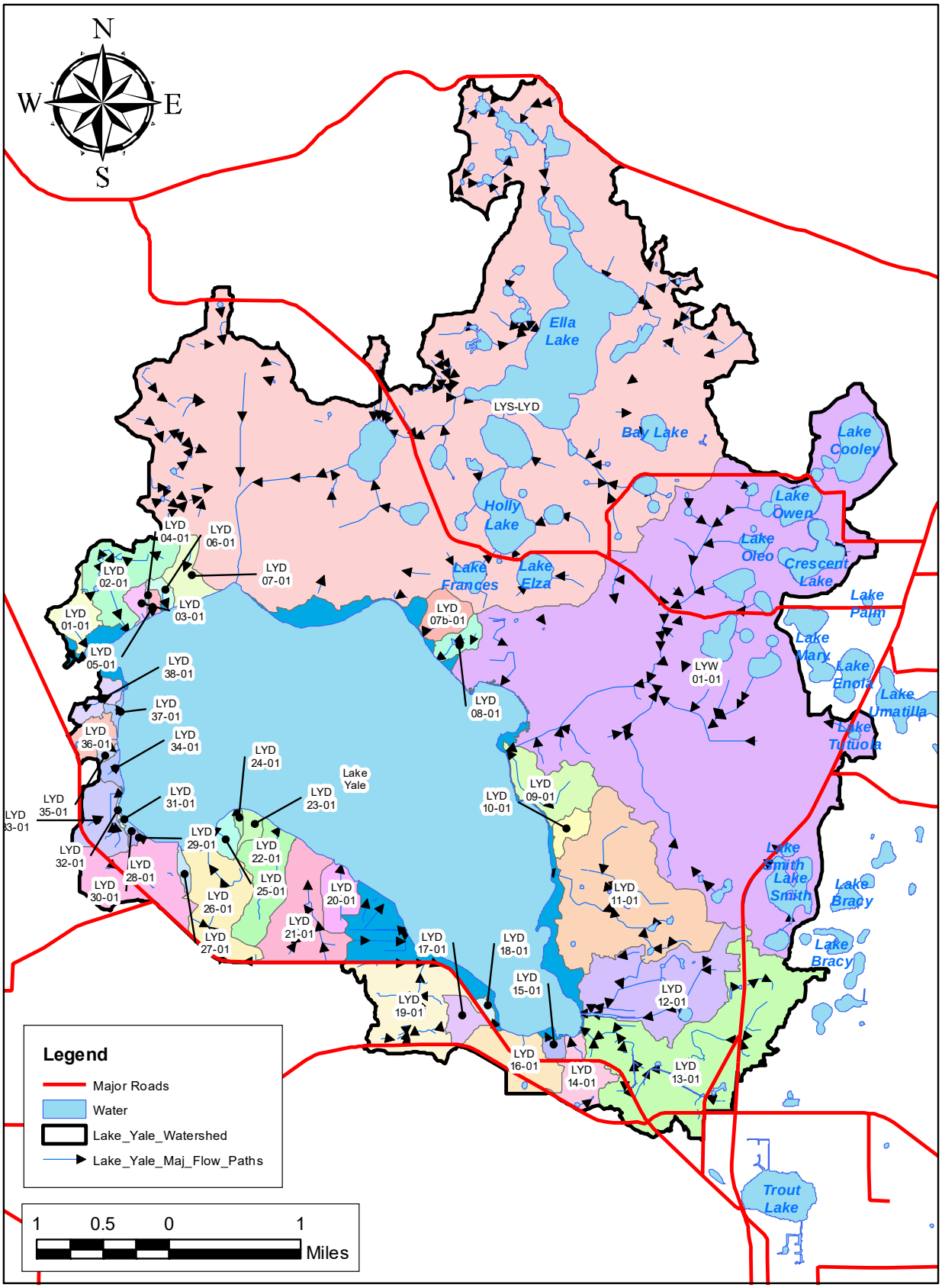


Figure 3-3. Overview of Sub-basin Areas Discharging to Lake Yale.

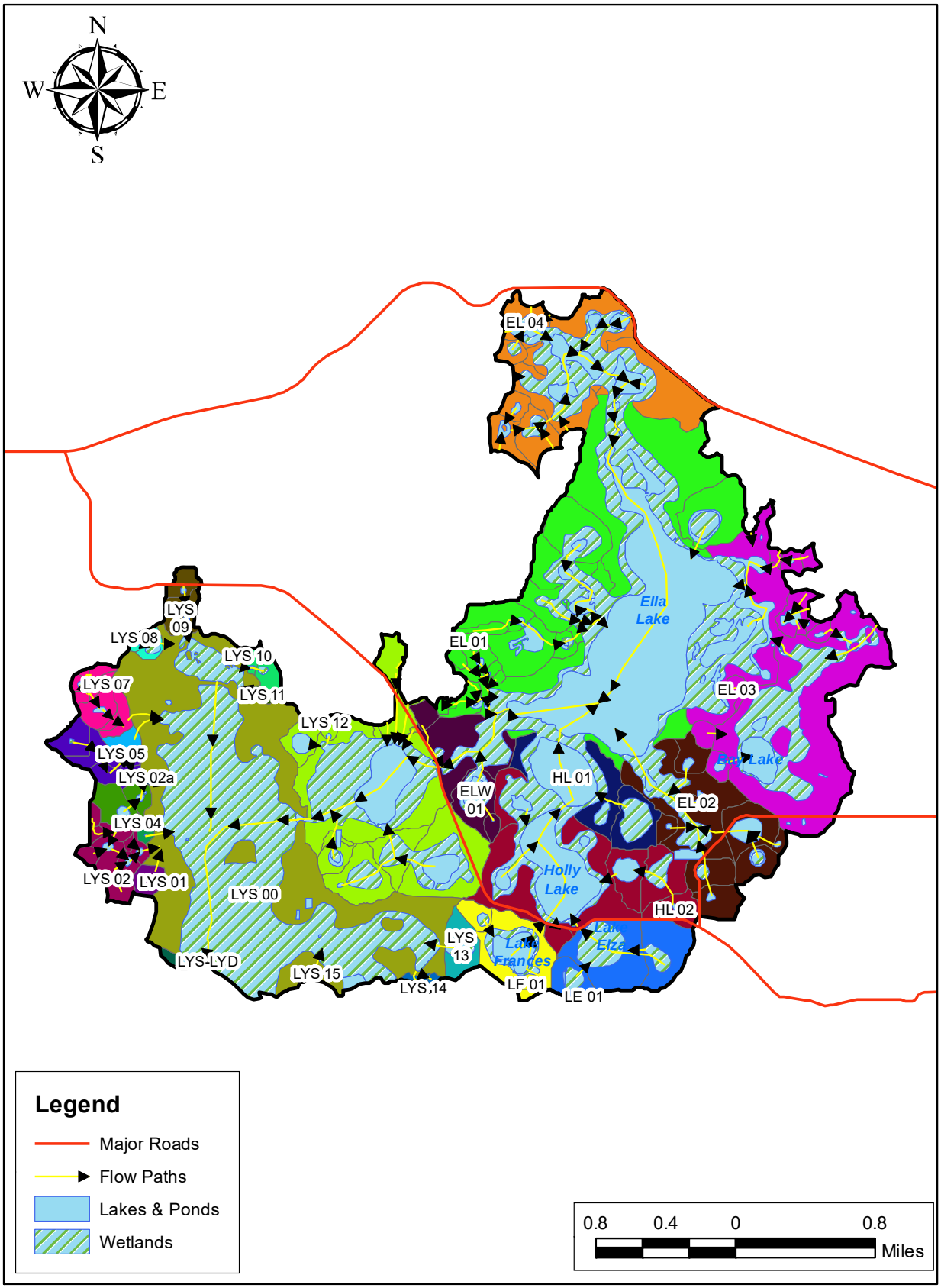


Figure 3-4. Overview of the Lake Yale Slough Sub-basin.

TABLE 3-2

SUMMARY OF SUB-BASIN AREAS DISCHARGING TO LAKE YALE

SUB-BASIN	TOTAL	PERCENT OF TOTAL (%)	SUB-BASIN	TOTAL	PERCENT OF TOTAL (%)
Lake Yale Slough	6,362.6	41.3	LYD 19-01	291.3	1.9
LYW 01-01	4,205.8	27.3	LYD 20-01	80.7	0.5
LYD 01-01	68.1	0.4	LYD 21-01	231.7	1.5
LYD 02-01	196.3	1.3	LYD 22-01	160.2	1.0
LYD 03-01	22.3	0.1	LYD 23-01	23.2	0.2
LYD 04-01	3.9	< 0.1	LYD 24-01	7.3	0.0
LYD 05-01	11.7	0.1	LYD 25-01	40.9	0.3
LYD 06-01	17.5	0.1	LYD 26-01	223.0	1.4
LYD 07a-01	75.3	0.5	LYD 27-01	14.8	0.1
LYD 07b-01	69.8	0.5	LYD 28-01	232.6	1.5
LYD 08-01	43.4	0.3	LYD 29-01	7.5	< 0.1
LYD 09-01	152.1	1.0	LYD 30-01	5.9	< 0.1
LYD 10-01	38.5	0.3	LYD 31-01	2.5	< 0.1
LYD 11-01	639.5	4.2	LYD 32-01	2.6	< 0.1
LYD 12-01	399.7	2.6	LYD 33-01	108.1	0.7
LYD 13-01	757.1	4.9	LYD 34-01	22.4	0.1
LYD 14-01	97.0	0.6	LYD 35-01	9.3	0.1
LYD 15-01	16.7	0.1	LYD 36-01	55.4	0.4
LYD 16-01	148.9	1.0	LYD 37-01	15.4	0.1
LYD 17-01	51.3	0.3	LYD 38-01	42.6	0.3
LYD 18-01	10.2	0.1	Direct	434.1	2.8
			TOTAL:	**15,399.2**	**100.0**

An overview of drainage features and water movement patterns in the Lake Yale Wetland (LYW) sub-basin area is given on Figure 3-5. This sub-basin contains multiple significant water features identified as Lake Cooley, Lake Owen, Crescent Lake, Lake Oleo, Lake Tutuola, and Lake Smith, in addition to marshes and extensive wetland systems. Drainage patterns in this sub-basin originate with Lake Cooley in the northeast portion of the sub-basin, discharging downstream to Lake Owen and a series of interconnected wetland areas. Drainage generated in southern portions of the Lake Yale Wetland sub-basin migrate in a north or northwest direction, ultimately entering the large wetland system immediately adjacent to Lake Yale. Excess runoff within the basin then discharges into Lake Yale by diffuse overland flow through a large wetland interface with the lake. Minor sub-basin areas are also indicated on Figure 3-5 which are used to conduct separate hydrologic modeling for portions of sub-basins with significant volumetric attenuation for runoff.

An overview of sub-basin areas discharging directly to Lake Yale is given on Figure 3-6. Each of these sub-basin areas is identified by the prefix “LYD” and reflects relatively small watershed areas which discharge to Lake Yale through a defined channel, tributary, or stormsewer system. These drainage sub-basins range in size from 2.3-639.4 acres and cumulatively comprise approximately 27.9% of the total drainage basin area discharging to Lake Yale. Drainage patterns within the individual sub-basins are illustrated on Figure 3-6 which includes significant channels and waterbodies.

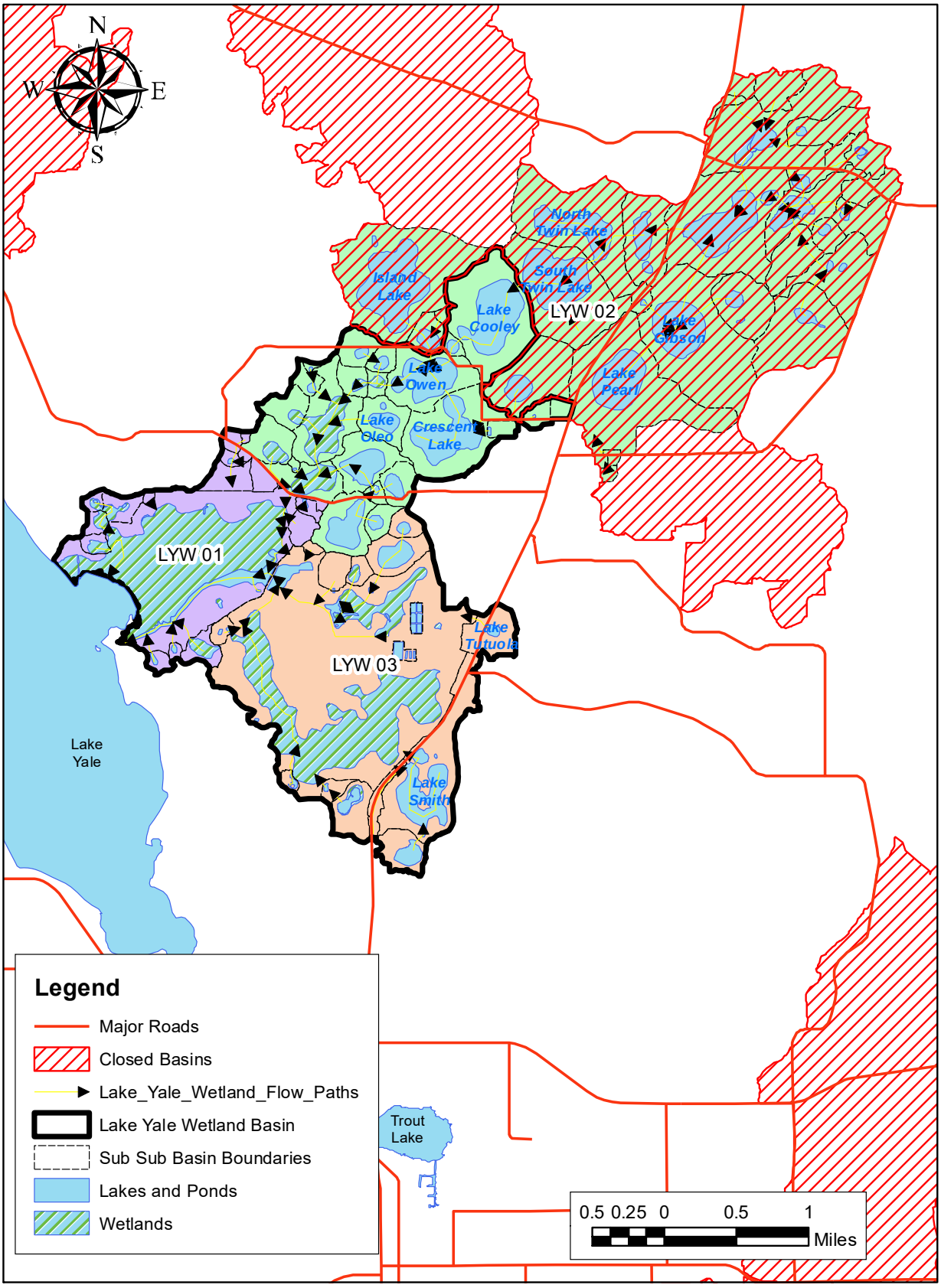


Figure 3-5. Overview of the Lake Yale Wetland Sub-basin.

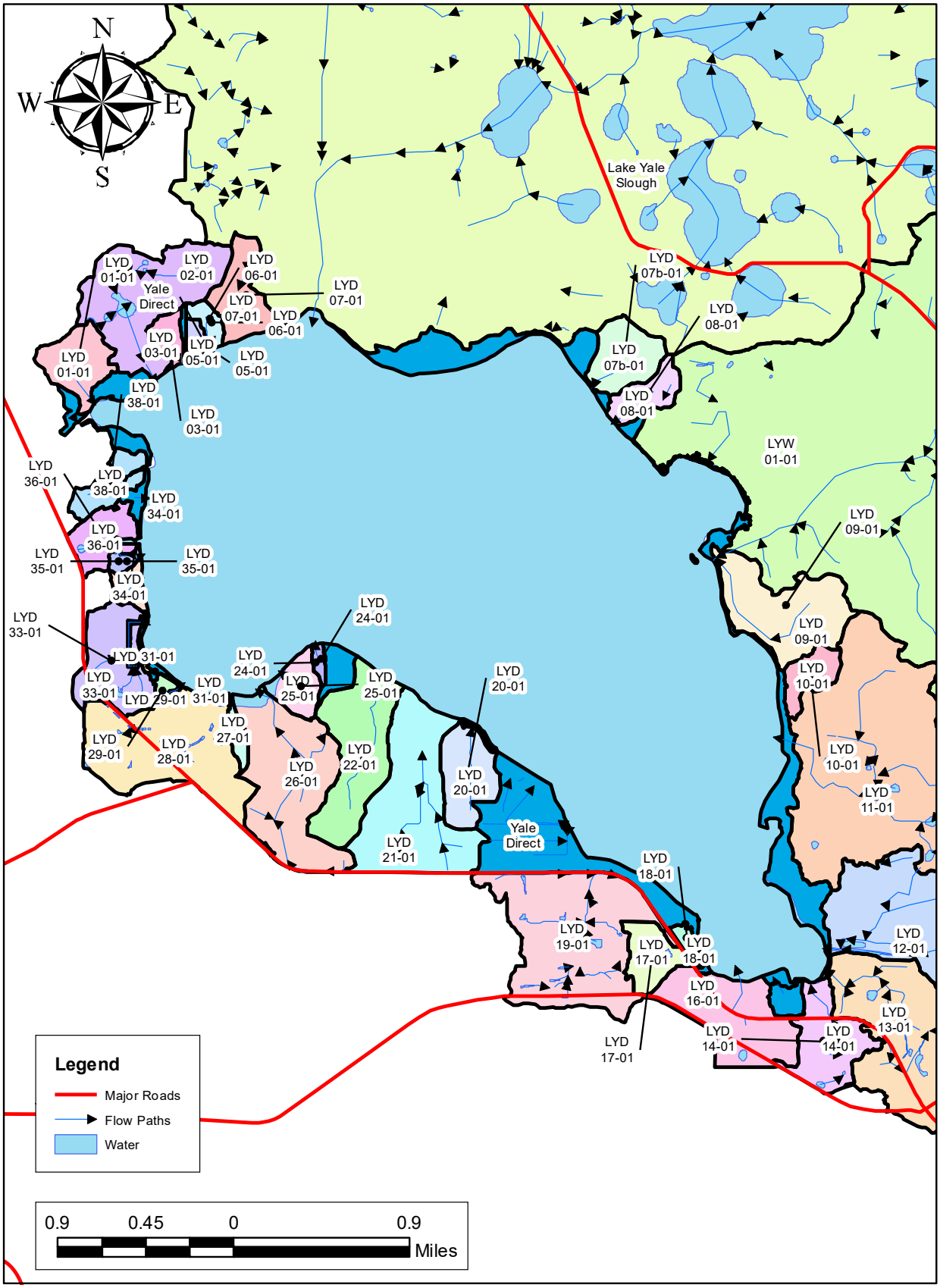


Figure 3-6. Overview of Drainage Sub-basin Areas Discharging Directly to Lake Yale.

In addition to the sub-basins identified as LYD, areas are also delineated which provide direct overland flow into Lake Yale without a defined tributary or channel. These areas are referred to as “direct” and are indicated by the dark blue color on Figure 3-6. The direct sub-basin areas comprise approximately 3.3% of the total overall drainage basin area.

3.1.2 Trout Lake

An overview of drainage sub-basin areas discharging to Trout Lake is given on Figure 3-7. Twelve (12) separate sub-basin areas were identified which discharge to Trout Lake through defined channels, tributaries, canals, or diffuse wetland flow, with a total area of 9,387 acres. A summary of individual sub-basin areas discharging to Trout Lake is given on Table 3-3. The largest sub-basin area is the Hicks Ditch sub-basin which comprises approximately 80.7% of the total overall drainage basin area. The Trout Lake wetland sub-basin, located primarily on the east side of Trout Lake, comprises approximately 11.7% of the overall basin area. The next largest sub-basin area is identified as TL 07-01, which discharges into the southeast side of Trout Lake and comprises 5.4% of the total overall basin area. The remaining sub-basin areas are relatively small and comprise <0.1-0.8% of the total basin area.

TABLE 3-3

SUMMARY OF SUB-BASIN AREAS DISCHARGING TO TROUT LAKE

SUB-BASIN	TOTAL	PERCENT OF TOTAL (%)
Hicks Ditch	7,579.2	80.7
TLW	1,102.4	11.7
TL 01-02	72.0	0.8
TL 02-01	16.0	0.2
TL 03-01	6.7	0.1
TL 04-01	8.5	0.1
TL 05-01	34.6	0.4
TL 06-01	22.7	0.2
TL 07-01	511.0	5.4
TL 08-01	30.6	0.3
TL 09-01	1.5	< 0.1
Direct	2.1	< 0.1
Total:	**9,387**	**100.0**

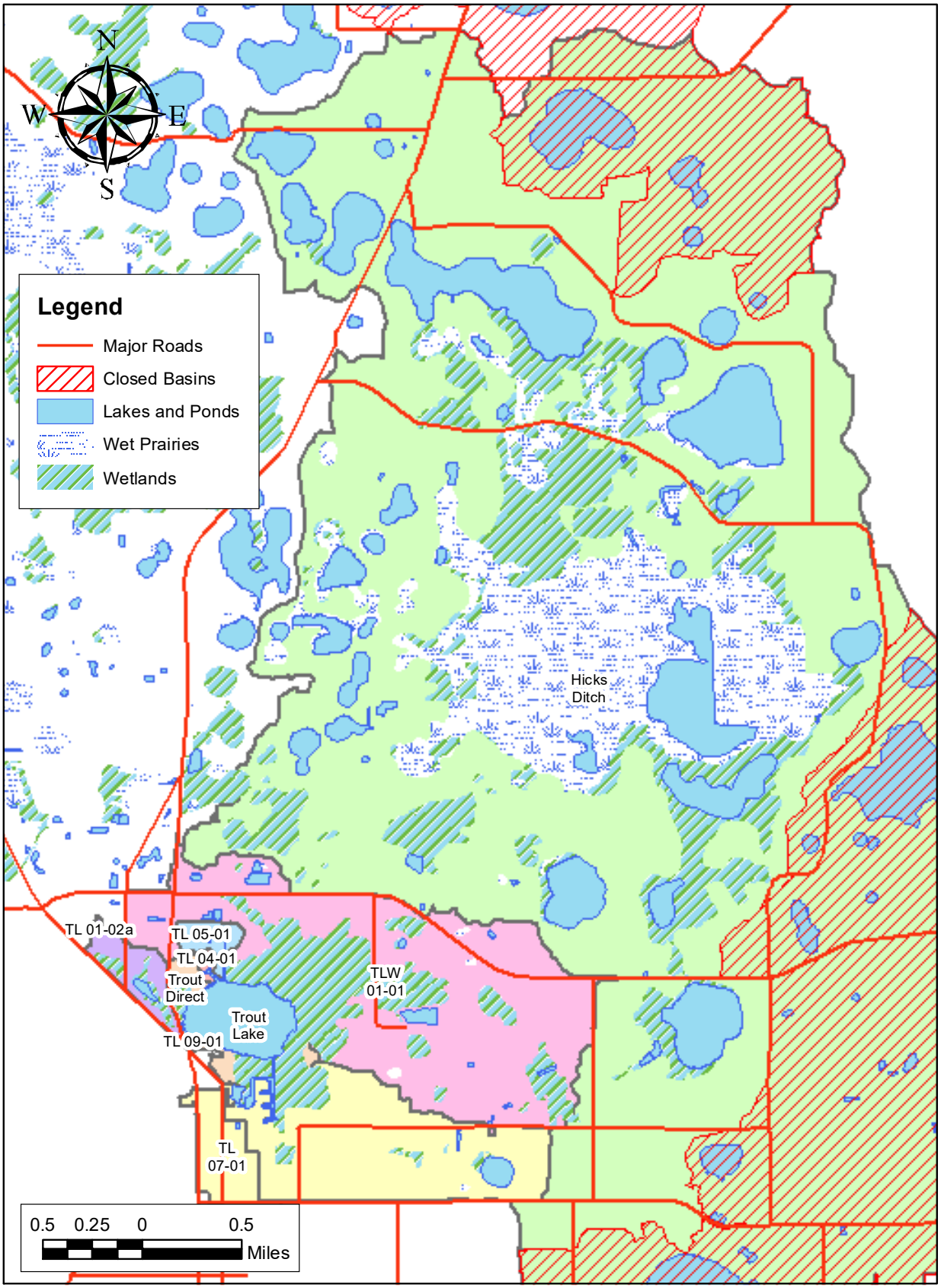


Figure 3-7. Overview of Drainage Sub-basin Areas Discharging to Trout Lake.

An overview of the Hicks Ditch and Trout Lake wetland sub-basin areas is given on Figure 3-8. The Hicks Ditch basin, designated by “HD” on Figure 3-8, is the single largest sub-basin discharging to Trout Lake and extends approximately 6 miles to the north of Trout Lake. The Hicks Ditch sub-basin is primarily rural in character, with multiple interconnected named waterbodies including Lake Palm, Lake Geneva, Lake Mary, Lake Enola, Lake Umatilla, Lake Burns, Lake Whitcomb, Lake Blanchester, Lake Bracy, Lake Myrtle, and Clear Lake in addition to large marsh areas owned by SJRWMD. The northern waterbodies are interconnected, with the discharge from Lake Umatilla forming the initial upstream portions of Hicks Ditch. The Hicks Ditch tributary also receives the combined discharges from the western waterbodies which include Lake Burns, Lake Whitcomb, and Lake Blanchester. Multiple western inflows discharge to Hicks Ditch including Lake Bracy along with multiple additional agricultural channels and canals in southern portions of the Hicks Ditch sub-basin. The combined discharges from Hicks Ditch pass beneath SR 44A and enter the large wetland system located on the north and east sides of Trout Lake. Hicks Ditch does not have a well defined channelized flow through the wetland, but appears to spread out within the wetland area and contribute a diverse overland flow into the north and east sides of Trout Lake. Numerous minor sub-basin areas are also illustrated on Figure 3-8 which are used to calculate internal storage in wetlands, waterbodies, and depressional areas.

An overview of the Trout Lake wetland sub-basin area, designated as “TLW”, is also included on Figure 3-8. The wetland receives multiple inflows from sub-basin areas such as Hicks Ditch, along with agricultural and rural areas south of SR 44A and east of Hicks Ditch Road which discharge beneath Hicks Ditch Road and enter the east side of the Trout Lake wetland area.

The remaining sub-basin areas discharging to Trout Lake, designated as “TL”, are relatively minor and are illustrated on Figure 3-9. The Trout Lake sub-basin areas range in size from 1.5-511 acres and reflect <0.1-5.4% of the total basin area individually. The largest of the minor sub-basin areas is Sub-basin TL 07-01 which includes a 511-acre wetland area that discharges through a canal located on the southeast corner of Trout Lake. This sub-basin consists primarily of natural areas and wetlands, with a small amount of residential development. The remaining minor sub-basin areas contain mobile homes, residential areas, highway, commercial, and natural areas.

3.2 Land Use

Land use information for the Lake Yale and Trout Lake drainage basins was obtained from the 2014 Land Use Inventory conducted by SJRWMD. This information was initially obtained in a GIS format in the form of Level III FLUCCS (Florida Land Use Cover and Classification System) codes. The Level III FLUCCS codes were condensed by ERD to a series of general land use categories to simplify presentation of the information and to assist in identifying runoff characteristics discussed in Section 5. This information was used by ERD as a preliminary base map, and modifications to the land use characterization data were made, as necessary, using a combination of aerial photography and field reconnaissance to reflect land use under current conditions.

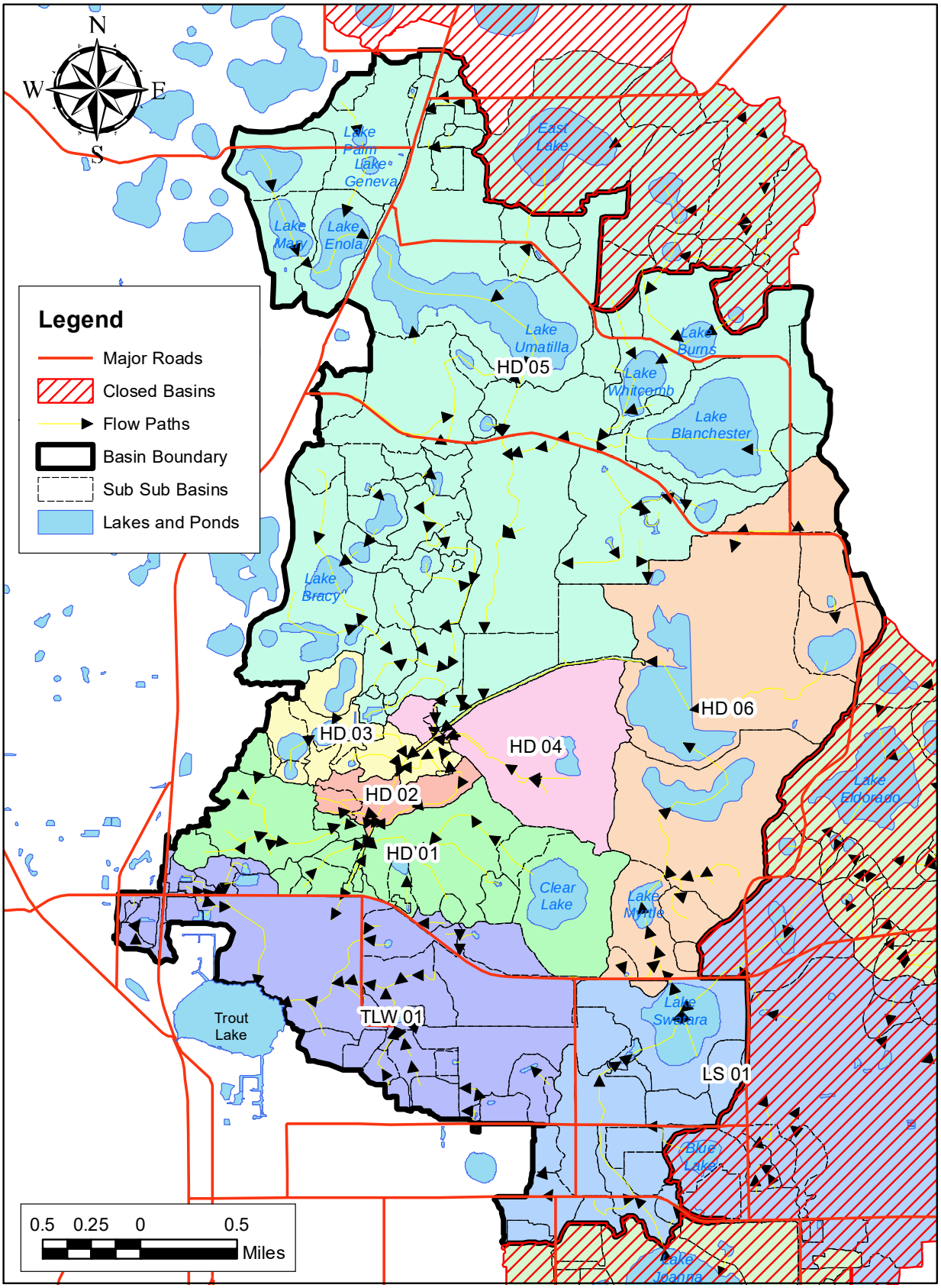


Figure 3-8. Overview of the Hicks Ditch and Trout Lake Wetland Sub-basin Areas.

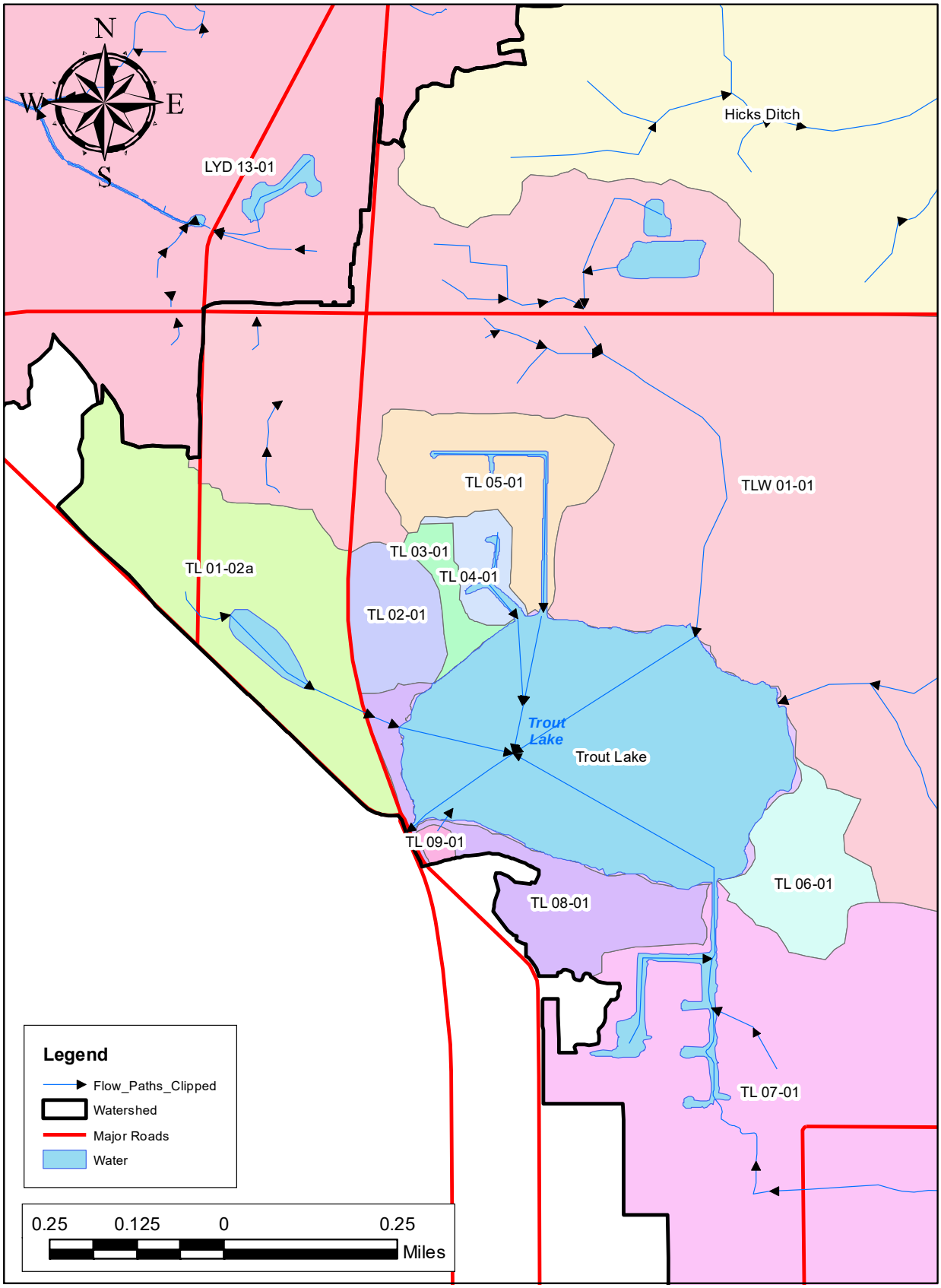


Figure 3-9. Overview of Sub-basin Areas Adjacent to Trout Lake.

3.2.1 Lake Yale

An overview of current land use in the Lake Yale contributing drainage basin area is given in Figure 3-10. The dominant land use categories within the Lake Yale drainage basin appear to be natural areas, wetlands, agricultural areas, and water.

A tabular summary of current land use in the Lake Yale drainage basin is given in Table 3-4. The largest land use categories within the Lake Yale drainage basin are wet prairie (which cover approximately 19.0% of the total basin area), followed by pasture land (11.8%), wetlands (11.4%), water (10.1%), upland mixed forests (9.2%), and citrus groves (8.7%). Each of the remaining land use categories comprises approximately 5% or less of the total drainage basin area. Approximately 17.4% of the Lake Yale drainage basin is covered by developed land use categories which includes commercial, high-density residential, highway, industrial, institutional, low-density residential, medium-density residential, mining, nurseries, recreational, and utilities, with the remaining land uses consisting of natural areas and agriculture.

3.2.2 Trout Lake

An overview of current land use in the Trout Lake drainage basin is given on Figure 3-11. In contrast to the Lake Yale drainage basin, the Trout Lake drainage basin contains a relatively large amount of residential development, along with natural areas and agricultural land use.

A tabular summary of existing land use in the Trout Lake drainage basin is given in Table 3-5. The single largest land use category in the Trout Lake basin is wetlands, which comprises 14.4% of the overall basin area. Approximately 13.3% of the basin area consists of agriculture (citrus + nurseries + pasture), with 12.6% of the basin consisting of wet prairies, 11.9% in medium-density residential, 10.6% in upland mixed forests, 10.5% in water, and 7.0% in upland forest. Each of the remaining land uses comprises approximately 5% or less of the basin area. Approximately 24.4% of the Trout Lake drainage basin consists of developed land use categories, including commercial, high-density residential, highway, industrial, institutional, low-density residential, medium-density residential, recreational, and utilities, with the remaining land use categories consisting of natural areas, water, and agriculture.

3.3 Soil Characteristics

Information on soil types within the Lake Yale and Trout Lake drainage basins was obtained from the SJRWMD GIS database. Soil information was extracted in the form of Hydrologic Soil Groups (HSG) which classify soil types with respect to runoff-producing characteristics. Using this system, soils are classified into groups for evaluation and modeling purposes. The chief consideration in each of the soil group types is the inherent capacity of bare soil to permit infiltration. A summary of the characteristics of hydrologic soil groups present in the Lake Yale and Trout Lake drainage basins is given in Table 3-6.

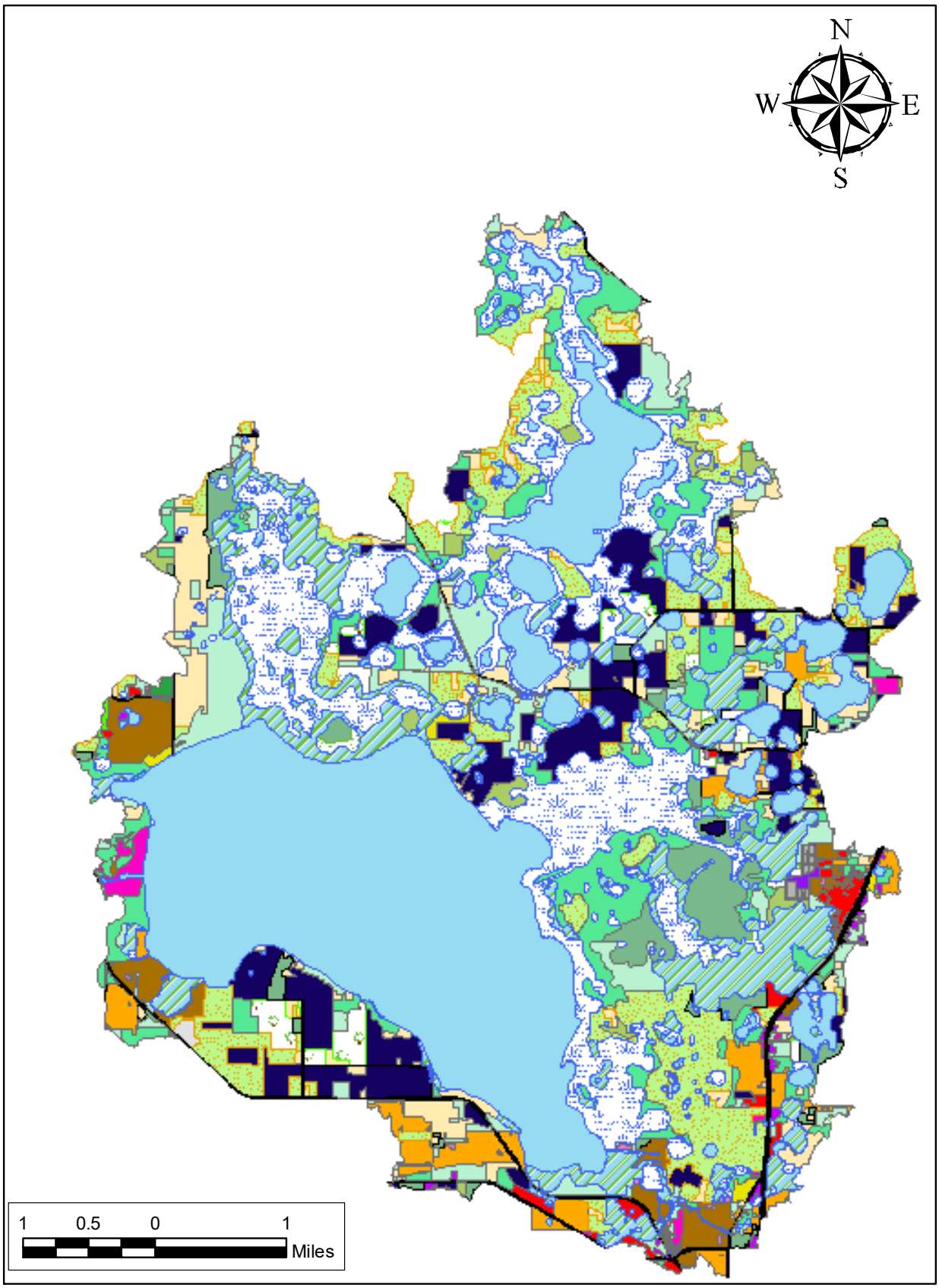


Figure 3-10. Land Use Characteristics in the Lake Yale Contributing Drainage Basin.

TABLE 3-4

EXISTING LAND USE IN THE LAKE YALE DRAINAGE BASIN

SUB-BASIN	LAND USE																							TOTAL
	Citrus Groves	Commercial	Golf Courses	Industrial	Institutional	Low-Density Residential	Medium-Density Residential	Mining	Mobile Homes	Multi-Family Residential	Nurseries	Pasture	Pine Flatwoods	Recreational	Row Crops	Scrub and Brushland	Stormwater Pond	Transportation	Upland Hardwoods	Upland Mixed	Upland Non-Forested	Utilities	Water	Wet Prairies	Wetlands	Xeric Oak	
Lake Yale Slough	501.0	--	--	--	--	417.0	1.2	--	--	--	88.4	721.1	98.4	14.5	--	4.2	1.6	39.7	112.0	454.7	503.8	--	996.9	1,755.4	652.7	--	**6,362.6**
LYW 01-01	294.2	23.3	--	73.5	17.2	193.2	114.0	--	48.7	--	27.6	316.8	382.5	7.7	7.8	38.6	3.7	72.0	52.0	531.7	169.4	39.2	458.7	707.7	626.3	--	**4,205.8**
LYD 01-01	--	--	1.2	2.9	--	0.7	--	--	15.6	--	--	9.4	4.9	--	--	--	--	--	--	20.5	1.1	--	0.3	7.6	3.9	--	**68.1**
LYD 02-01	--	2.6	5.9	4.2	--	38.7	--	--	93.9	--	--	7.5	--	6.1	--	--	0.6	5.7	--	0.2	7.8	--	7.3	1.2	--	14.6	**196.3**
LYD 03-01	--	--	--	--	--	--	--	--	17.9	--	--	--	--	3.5	--	--	--	0.1	--	--	--	--	0.8	--	--	--	**22.3**
LYD 04-01	--	--	--	--	--	--	--	--	1.5	--	--	--	--	--	--	--	--	2.2	--	--	0.1	--	0.1	--	--	--	**3.9**
LYD 05-01	--	--	--	--	--	--	--	--	--	--	--	3.8	--	--	--	--	0.9	0.1	--	--	5.9	--	1.0	--	--	--	**11.7**
LYD 06-01	--	--	--	--	--	6.9	--	--	--	--	--	1.4	--	--	--	--	--	--	--	--	8.7	--	0.5	--	--	--	**17.5**
LYD 07a-01	--	--	--	--	--	10.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	58.9	--	5.4	--	0.3	--	**75.3**
LYD 07b-01	24.1	--	--	--	--	0.2	--	--	--	--	--	18.2	--	0.1	--	--	--	--	--	--	--	--	0.4	--	26.8	--	**69.8**
LYD 08-01	36.0	--	--	--	--	3.1	--	--	--	--	--	--	--	--	--	--	--	--	0.9	--	0.1	--	1.1	2.2	--	--	**43.4**
LYD 09-01	--	--	--	--	--	--	--	--	--	--	--	17.0	5.0	--	--	--	--	--	--	62.2	4.6	--	--	48.0	15.3	--	**152.1**
LYD 10-01	--	--	--	--	--	--	--	--	--	--	--	--	2.0	--	--	--	--	--	--	14.4	9.3	--	--	12.8	--	--	**38.5**
LYD 11-01	--	--	--	--	--	6.0	10.0	--	--	--	--	238.1	45.2	--	--	--	--	--	8.7	58.6	53.2	--	6.7	156.4	56.6	--	**639.5**
LYD 12-01	12.5	--	--	7.0	--	10.2	21.7	--	15.4	--	--	178.0	4.3	--	--	--	3.2	--	--	27.5	7.2	0.9	11.2	99.3	1.3	--	**399.7**
LYD 13-01	12.2	19.0	--	24.8	16.5	47.2	66.6	--	119.0	1.2	--	72.7	17.5	14.8	--	1.9	10.3	47.4	0.6	33.9	52.6	--	5.8	34.3	158.8	--	**757.1**
LYD 14-01	--	--	--	13.0	1.4	3.4	3.2	--	--	--	--	20.7	--	--	--	--	--	5.2	--	--	5.8	--	1.1	1.2	42.0	--	**97.0**
LYD 15-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.7	--	--	--	7.0	--	**16.7**
LYD 16-01	11.1	--	--	15.1	--	6.9	49.0	--	--	--	--	0.6	--	--	--	--	--	15.9	--	8.9	11.3	--	2.5	0.3	27.3	--	**148.9**
LYD 17-01	--	--	--	--	--	7.1	35.0	--	--	--	--	--	--	--	--	--	0.5	1.8	--	--	6.9	--	--	--	--	--	**51.3**
LYD 18-01	--	--	--	--	--	--	10.0	--	--	--	--	--	--	--	--	--	0.1	0.1	--	--	--	--	--	--	--	--	**10.2**
LYD 19-01	17.2	4.7	--	--	--	65.0	104.4	--	--	--	--	10.5	16.1	--	--	--	3.4	12.6	4.2	7.3	45.9	--	--	--	--	--	**291.3**
LYD 20-01	24.6	--	--	--	--	2.3	--	--	--	--	38.4	--	--	--	--	--	--	1.0	--	10.1	1.2	--	3.1	--	--	--	**80.7**
LYD 21-01	118.8	--	--	--	--	22.7	--	--	--	--	29.6	16.2	--	--	--	--	--	8.3	--	9.0	23.6	--	3.5	--	--	--	**231.7**
LYD 22-01	61.7	--	--	--	--	13.1	--	--	--	--	31.5	24.1	20.3	--	--	--	--	2.9	--	--	4.4	--	2.2	--	--	--	**160.2**
LYD 23-01	13.0	--	--	--	--	1.5	--	--	--	--	--	--	7.3	--	--	--	--	--	--	--	--	--	1.4	--	--	--	**23.2**
LYD 24-01	5.1	--	--	--	--	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	0.5	--	**7.3**
LYD 25-01	34.5	--	--	--	--	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.2	--	0.6	--	**40.9**
LYD 26-01	48.7	--	--	--	--	--	--	--	--	--	27.4	107.9	--	--	--	--	--	2.6	--	26.9	--	--	9.5	--	--	--	**223.0**
LYD 27-01	1.4	--	--	--	--	--	--	--	1.7	--	--	11.3	--	--	--	--	--		--	--	--	--	0.4	--	--	--	**14.8**
LYD 28-01	2.0	--	--	--	--	3.4	47.1	15.4	36.1	--	--	33.4	4.1	--	--	--	2.4	9.5	--	21.6	12.0	--	2.1	--	43.5	--	**232.6**
LYD 29-01	--	--	--	--	--	--	--	--	6.9	--	--	--	--	--	--	--	--	--	--	--	--	--	0.6	--	--	--	**7.5**
LYD 30-01	--	--	--	--	--	--	--	--	4.1	--	--	--	--	--	--	--	--	--	--	--	--	--	1.8	--	--	--	**5.9**
LYD 31-01	--	--	--	--	--	--	0.9	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	--	**2.5**
LYD 32-01	--	--	--	--	--	--	1.9	--		--	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	**2.6**
LYD 33-01	--	--	--	--	--	--	6.5	--	35.3	--	--	--	--	--	--	--	1.6	4.3	--	36.0	8.4	--	2.5	1.9	11.6	--	**108.1**
LYD 34-01	--	--	--	--	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19.9	--	--	1.9	--	--	--	**22.4**
LYD 35-01	--	--	--	--	7.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.2	--	--	0.4	--	--	--	**9.3**
LYD 36-01	--	--	--	--	31.5	1.0	--	--	2.6	--	--	--	--	--	--	--	--	0.6	--	13.1	1.2	--	5.4	--	--	--	**55.4**
LYD 37-01	--	--	--	--	10.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.4	--	--	3.4	--	--	--	**15.4**
LYD 38-01	--	--	--	--	9.4	2.6	--	--	--	--	--	--	--	--	--	--	0.9	--	--	25.8	3.7	--	0.1	0.1	--	--	**42.6**
Direct	116.7	--	--	--	--	33.1	6.3	--	0.5	--	--	13.5	5.2	1.2	--	13.5	--	11.9	--	32.7	12.5	--	3.3	96.2	87.5	--	**434.1**
Totals:	**1,334.8**	**49.6**	**7.1**	**140.5**	**94.9**	**898.2**	**477.8**	**15.4**	**400.4**	**1.2**	**242.9**	**1,822.2**	**612.8**	**47.9**	**7.8**	**58.2**	**29.2**	**243.9**	**178.4**	**1,417.6**	**1,029.3**	**40.1**	**1,547.8**	**2,924.6**	**1,762.0**	**14.6**	**15,399.2**
% of total:	**8.7**	**0.3**	**0.0**	**0.9**	**0.6**	**5.8**	**3.1**	**0.1**	**2.6**	**0.0**	**1.6**	**11.8**	**4.0**	**0.3**	**0.1**	**0.4**	**0.2**	**1.6**	**1.2**	**9.2**	**6.7**	**0.3**	**10.1**	**19.0**	**11.4**	**0.1**	**100.0**

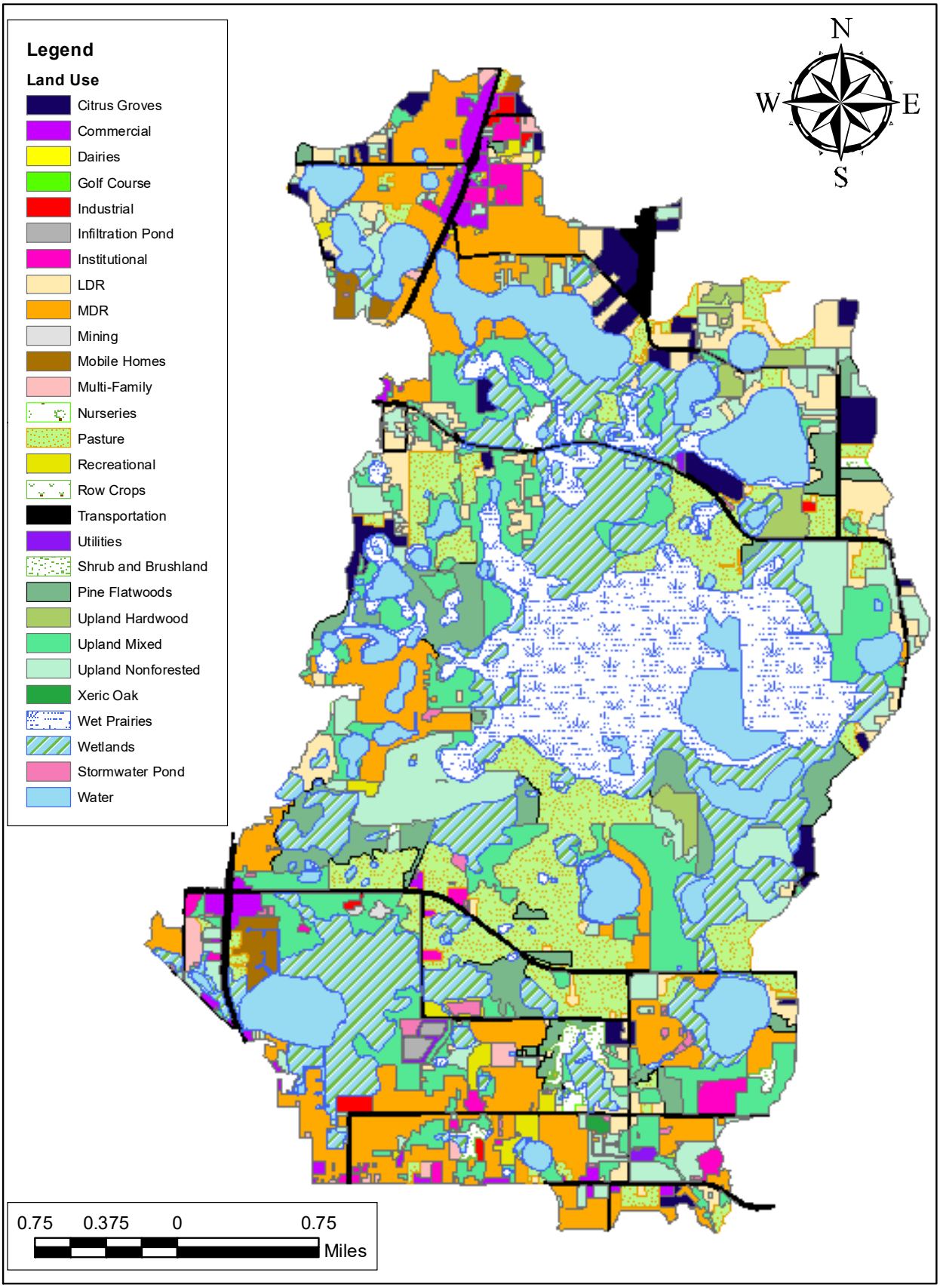


Figure 3-11. Land Use Characteristics in the Trout Lake Contributing Drainage Basin.

TABLE 3-5

EXISTING LAND USE IN THE TROUT LAKE DRAINAGE BASIN

SUB-BASIN	LAND USE																							TOTAL
	Citrus Groves	Commercial	Industrial	Institutional	Low-Density Residential	Medium-Density Residential	Mining	Mobile Homes	Multi-Family Residential	Nurseries	Pasture	Pine Flatwoods	Recreational	Scrub and Brushland	Stormwater Pond	Transportation	Upland Hardwoods	Upland Mixed	Upland Non-Forested	Utilities	Water	Wet Prairies	Wetlands	Xeric Oak	
Hicks Ditch	238.9	79.1	14.2	88.5	438.3	749.7	--	28.8	10.5	27.0	753.4	346.8	22.3	9.0	21.2	178.6	111.4	754.8	616.0	9.1	947.2	1,175.2	953.4	5.8	7,579.2
TLW	6.9	28.2	2.9	12.6	20.6	85.2	6.0	2.2	17.2	7.1	196.7	78.4	30.5	28.0	17.5	61.1	--	160.4	20.2	22.5	7.8	5.2	285.2	--	1,102.4
TL 01-02	--	3.3	--	2.0	--	16.1	--	--	7.8	--	--	--	--	--	0.9	9.4	--	1.7	12.1	--	3.5	--	15.2	--	72.0
TL 02-01	--	--	--	--	0.7	--	--	1.3	--	--	6.3	--	--	--	--	2.2	--	--	--	--	--	--	5.5	--	16.0
TL 03-01	--	--	--	--	--	--	--	5.8	--	--	0.8	--	--	--	--		--	--	--	--	0.1	--	--	--	6.7
TL 04-01	--	--	--	--	--	--	--	7.4	--	--	--	--	--	--	--	--	--	--	--	--	1.1	--	--	--	8.5
TL 05-01	--	0.9	--	--	--	--	--	22.5	--	--	1.5	--	--	--	--	--	--	7.4	--	--	1.8	--	0.5	--	34.6
TL 06-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.8	--	--	0.2	--	18.7	--	22.7
TL 07-01	--	11.2	14.7	15.6	1.1	256.0	--	--	11.0	--	10.7	--	18.9	9.5	1.8	12.7	--	64.1	7.6	0.6	19.0	0.9	55.1	0.5	511.0
TL 08-01	--	1.4	--	--	0.6	6.3	--	--	--	--	--	--	--	--	--	2.5	--	--	4.7	--	0.3	--	14.8	--	30.6
TL 09-01	--	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	--	--	1.5
Direct	--	0.1	--	--	0.1	0.1	--	0.1	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--	1.6	--	2.1
Totals:	**245.8**	**125.6**	**31.8**	**118.7**	**461.4**	**1,113.4**	**6.0**	**68.1**	**46.5**	**34.1**	**969.4**	**425.2**	**71.7**	**46.5**	**41.4**	**266.5**	**111.4**	**992.2**	**660.8**	**32.2**	**981.0**	**1,181.3**	**1,350.0**	**6.3**	**9,387.3**
% of total:	**2.6**	**1.3**	**0.3**	**1.3**	**4.9**	**11.9**	**0.1**	**0.7**	**0.5**	**0.4**	**10.3**	**4.5**	**0.8**	**0.5**	**0.4**	**2.8**	**1.2**	**10.6**	**7.0**	**0.3**	**10.5**	**12.6**	**14.4**	**0.1**	**100.0**

TABLE 3-6

CHARACTERISTICS OF SCS HYDROLOGIC SOIL GROUP CLASSIFICATIONS

SOIL GROUP	DESCRIPTION	RUNOFF POTENTIAL	INFILTRATION RATE
A	Deep sandy soils	Very low	High
A / D	Deep sandy soils with high water table in undeveloped conditions	Very high in undeveloped condition	Very low in undeveloped state
		Very low when developed and water table lowered	Very high when water table lowered with development
B	Shallow sandy soils over low permeability layer; low water table	Low	Moderate
B / D	Shallow sandy soils over low permeability layer; high water table in undeveloped condition	Very high in undeveloped condition	Very low in undeveloped condition
		Low when developed and water table lowered	Moderate when developed and water table lowered
C / D	Sandy soil with high clay or organic content	Very high in undeveloped condition	Very low in undeveloped condition
		High when developed and water table lowered	Low when developed and water table lowered
D	Clayey soils	Very high	Low to none
W	Wetland or hydric soils	Very high	Low to none

3.3.1 Lake Yale

A graphical summary of hydrologic soil groups in contributing portions of the Lake Yale drainage basin is given on Figure 3-12. The Lake Yale drainage basin has a variety of hydrologic soil groups, including significant amounts of well drained soils in HSG A or B, both of which consist of deep sandy soils with a very low to low runoff potential, along with poorly drained soils under natural conditions, such as HSG A/D, B/D, C/D, and D, all of which have a low infiltration rate and a high runoff potential under undeveloped conditions. Large portions of HSG A soils are located on the southern and western ends of Lake Yale, with HSG A soils also scattered throughout the Lake Yale Slough sub-basin. Relatively poorly draining soils appear to be located primarily on the east and northeast sides of the lake.

A tabular summary of hydrologic soil groups in contributing portions of the Lake Yale drainage basin is given on Table 3-7. A breakdown of hydrologic soil groups is provided for each of the 42 sub-basin areas which discharge to Lake Yale. Overall, approximately 36.3% of the drainage basin area consists of relatively well drained soils in HSG A and B, with much of these areas currently used for citrus. Approximately 53.4% of the contributing drainage basin area is covered by HSG A/D, B/D, C/D, and D, all of which have a low infiltration rate and high runoff potential under undeveloped conditions. The remaining portions of the Lake Yale drainage basin consist of open water.

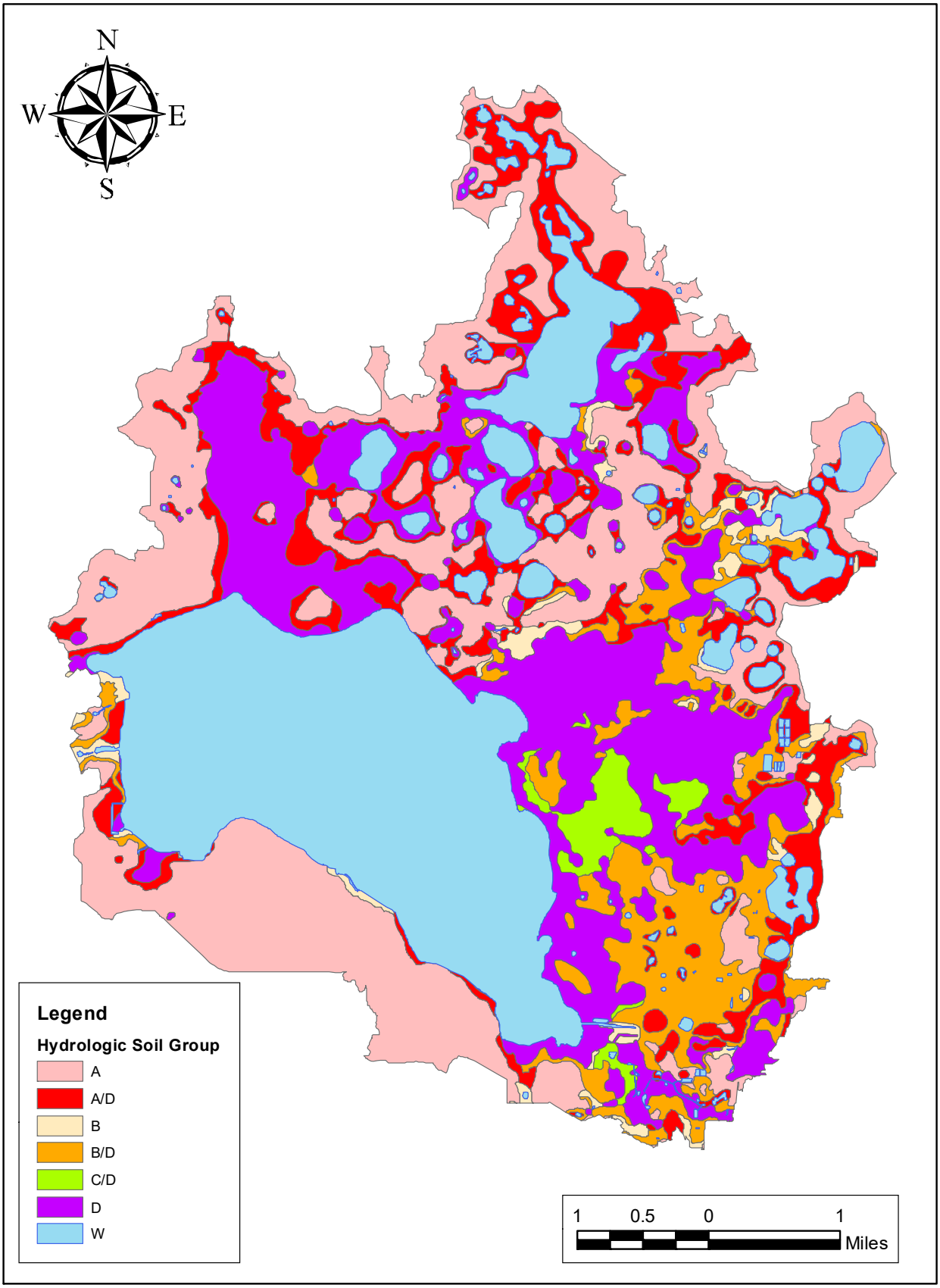


Figure 3-12. Hydrologic Soil Groups in Contributing Portions of the Lake Yale Drainage Basin.

TABLE 3-7

HYDROLOGIC SOIL GROUPS IN THE LAKE YALE CONTRIBUTING DRAINAGE BASIN

SUB-BASIN	HYDROLOGIC SOIL GROUP (acres)							TOTAL
	A	A / D	B	B / D	C / D	D	Water	
Lake Yale Slough	2,368.3	1,304.9	40.6	49.7	0.8	1,601.4	996.9	**6,362.6**
LYW 01-01	645.7	640.7	191.2	680.9	139.7	1,448.9	458.7	**4,205.8**
LYD 01-01	39.3	19.9	0.0	0.0	0.0	8.6	0.3	**68.1**
LYD 02-01	183.5	4.5	0.0	0.0	0.0	1.0	7.3	**196.3**
LYD 03-01	19.8	1.7	0.0	0.0	0.0	0.0	0.8	**22.3**
LYD 04-01	3.4	0.4	0.0	0.0	0.0	0.0	0.1	**3.9**
LYD 05-01	7.2	3.5	0.0	0.0	0.0	0.0	1.0	**11.7**
LYD 06-01	14.3	2.7	0.0	0.0	0.0	0.0	0.5	**17.5**
LYD 07a-01	61.8	8.1	0.0	0.0	0.0	0.0	5.4	**75.3**
LYD 07b-01	35.9	11.7	0.0	0.0	0.0	21.8	0.4	**69.8**
LYD 08-01	23.9	16.4	0.0	0.0	0.0	2.0	1.1	**43.4**
LYD 09-01	0.0	0.0	0.0	27.4	41.4	83.3	0.0	**152.1**
LYD 10-01	0.0	0.0	0.0	0.0	27.3	11.2	0.0	**38.5**
LYD 11-01	7.5	20.0	0.0	297.1	96.0	212.2	6.7	**639.5**
LYD 12-01	16.3	34.2	6.3	242.1	5.7	83.9	11.2	**399.7**
LYD 13-01	100.7	106.1	45.0	205.5	32.4	251.6	15.8	**757.1**
LYD 14-01	37.8	1.1	5.4	33.6	0.0	18.0	1.1	**97.0**
LYD 15-01	5.2	0.0	0.0	4.5	0.0	7.0	0.0	**16.7**
LYD 16-01	91.8	18.4	7.9	6.9	0.0	21.4	2.5	**148.9**
LYD 17-01	51.3	0.0	0.0	0.0	0.0	0.0	0.0	**51.3**
LYD 18-01	10.2	0.0	0.0	0.0	0.0	0.0	0.0	**10.2**
LYD 19-01	291.3	0.0	0.0	0.0	0.0	0.0	0.0	**291.3**
LYD 20-01	70.5	0.0	7.1	0.0	0.0	0.0	3.1	**80.7**
LYD 21-01	226.7	0.0	1.5	0.0	0.0	0.0	3.5	**231.7**
LYD 22-01	158.0	0.0	0.0	0.0	0.0	0.0	2.2	**160.2**
LYD 23-01	21.8	0.0	0.0	0.0	0.0	0.0	1.4	**23.2**
LYD 24-01	7.2	0.0	0.0	0.0	0.0	0.0	0.1	**7.3**
LYD 25-01	34.7	1.0	0.0	0.0	0.0	0.0	5.2	**40.9**
LYD 26-01	212.9	0.6	0.0	0.0	0.0	0.0	9.5	**223.0**
LYD 27-01	13.7	0.4	0.3	0.0	0.0	0.0	0.4	**14.8**
LYD 28-01	174.6	28.1	0.3	0.1	0.0	27.4	2.1	**232.6**
LYD 29-01	4.5	0.3	0.0	2.1	0.0	0.0	0.6	**7.5**
LYD 30-01	0.5	0.0	1.1	2.5	0.0	0.0	1.8	**5.9**
LYD 31-01	0.0	0.0	1.0	0.2	0.0	0.9	0.4	**2.5**
LYD 32-01	0.0	0.8	0.0	0.0	0.0	1.1	0.7	**2.6**
LYD 33-01	67.2	30.2	1.4	3.6	0.0	3.2	2.5	**108.1**
LYD 34-01	7.2	7.1	0.1	5.5	0.0	0.6	1.9	**22.4**
LYD 35-01	4.5	0.0	2.3	1.9	0.0	0.2	0.4	**9.3**
LYD 36-01	11.9	7.5	17.8	12.8	0.0	0.0	5.4	**55.4**
LYD 37-01	0.1	10.6	0.1	1.2	0.0	0.0	3.4	**15.4**
LYD 38-01	12.8	3.8	8.5	17.4	0.0	0.0	0.1	**42.6**
Direct	197.4	57.3	19.2	12.9	0.8	143.3	3.3	**434.1**
Totals:	**5,241.4**	**2,342.0**	**357.1**	**1,607.9**	**344.1**	**3,949.0**	**1,557.8**	**15,399.2**
% of total:	**34.0**	**15.2**	**2.3**	**10.4**	**2.2**	**25.6**	**10.1**	**100.0**

3.3.2 Trout Lake

A graphical summary of hydrologic soil groups in the Trout Lake drainage basin is given on Figure 3-13. The Trout Lake drainage basin also contains a variety of soil groups, including both well drained and poorly drained soils. Well drained soils, located in HSG A and B, appear to be located primarily in perimeter portions of the Trout Lake drainage basin, with poorly drained soils in HSG A/D, B/D, C/D, and D located primarily in central portions of the overall basin area.

A tabular summary of hydrologic soil groups in contributing portions of the Trout Lake drainage basin is given in Table 3-8. Approximately 32% of the overall Trout Lake contributing drainage basin consists of well drained soils in HSG A and B, with approximately 57.6% of the drainage basin area covered by poorly drained soils classified in HSG D under undeveloped conditions. The remaining 10.5% of the Trout Lake basin area is covered by open water.

TABLE 3-8

HYDROLOGIC SOIL GROUPS IN THE TROUT LAKE CONTRIBUTING DRAINAGE BASIN

SUB-BASIN	HYDROLOGIC SOIL GROUP (acres)							TOTAL
	A	A / D	B	B / D	C / D	D	Water	
Hicks Ditch	2,164.0	1,479.2	183.5	1,045.3	51.4	1,708.6	947.2	**7,579.2**
TLW	174.5	331.8	36.0	208.9	7.5	335.9	7.8	**1,102.4**
TL 01-02	2.5	1.7	40.7	8.6	0.0	15.0	3.5	**72.0**
TL 02-01	0.0	0.0	0.8	0.6	0.0	14.6	0.0	**16.0**
TL 03-01	0.0	0.0	2.4	0.0	0.0	4.2	0.1	**6.7**
TL 04-01	0.0	0.0	1.3	0.0	0.0	6.1	1.1	**8.5**
TL 05-01	0.0	0.0	1.4	0.0	8.4	23.0	1.8	**34.6**
TL 06-01	2.0	0.0	0.0	6.6	0.0	13.9	0.2	**22.7**
TL 07-01	343.5	63.7	34.3	1.9	0.0	48.6	19.0	**511.0**
TL 08-01	5.8	0.0	6.4	5.5	0.0	12.6	0.3	**30.6**
TL 09-01	0.4	0.0	1.1	0.0	0.0	0.0	0.0	**1.5**
Direct	0.0	0.0	0.5	0.0	0.0	1.6	0.0	**2.1**
Totals:	**2,692.7**	**1,876.4**	**308.4**	**1,277.4**	**67.3**	**2,184.1**	**981.0**	**9,387.3**
% of total:	**28.7**	**20.0**	**3.3**	**13.6**	**0.7**	**23.3**	**10.5**	**100.0**

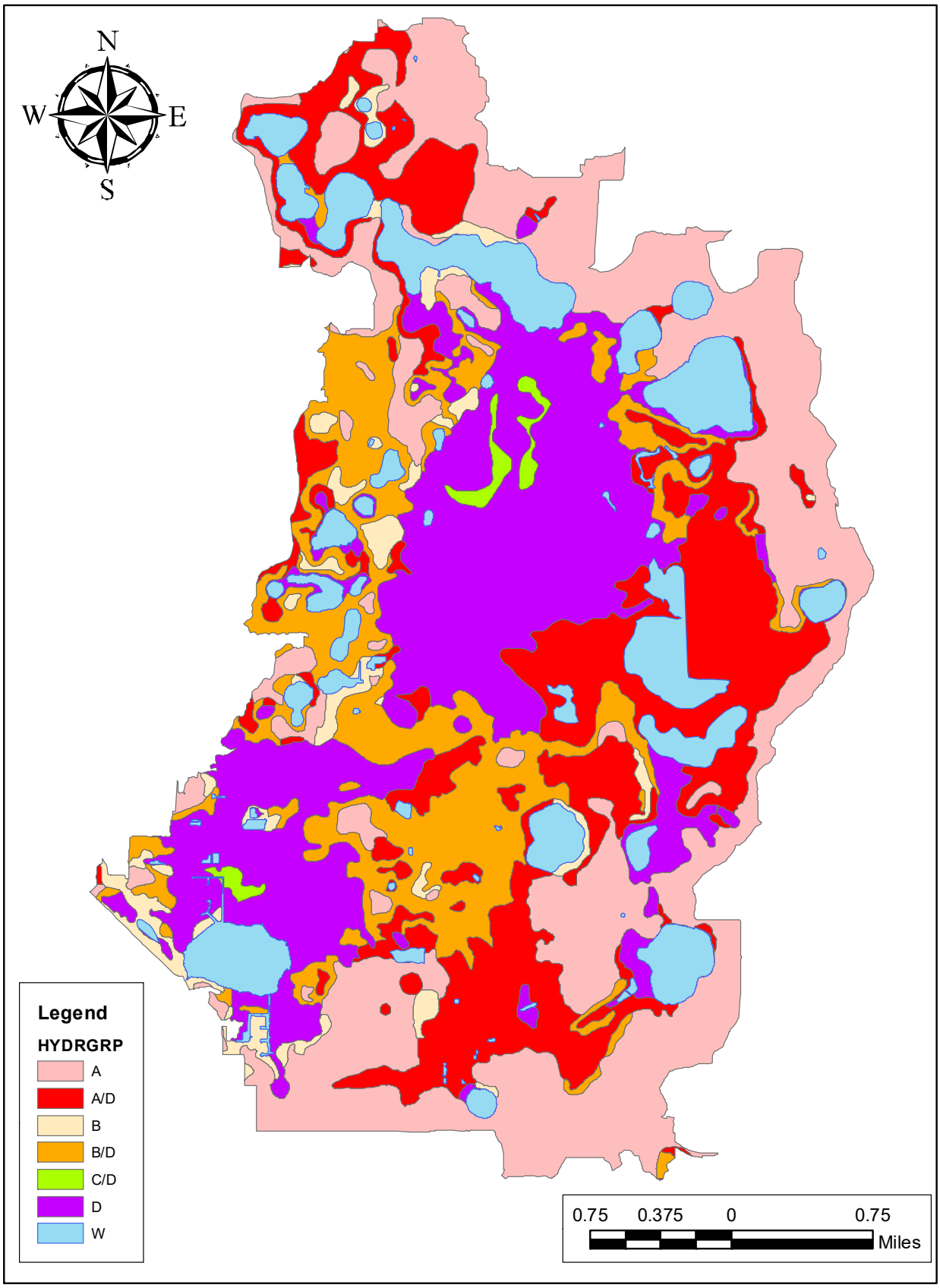


Figure 3-13. Hydrologic Soil Groups in Contributing Portions of the Trout Lake Drainage Basin.

3.4 Governmental Jurisdictions

An overview of governmental jurisdictions in the Lake Yale and Trout Lake drainage basins is given on Figure 3-14. The drainage basin boundary illustrated on this figure reflects the contributing portion of the overall drainage basin areas for the two lakes. City limits are provided for the cities of Eustis and Umatilla, along with boundary delineations for Lake County and Marion County. The vast majority of the contributing drainage basin areas for the two lakes is located in unincorporated Lake County, with portions of the Lake Yale drainage basin extending into Marion County. The cities of Eustis and Umatilla are located primarily in the Trout Lake drainage basin, with small portions of these cities extending into the Lake Yale drainage basin. As indicated on Figure 3-14, portions of the City of Eustis extend into the northwestern and southeastern portions of Trout Lake.

A tabular summary of governmental jurisdictions in contributing portions of the Lake Yale and Trout Lake drainage basins is given in Table 3-9. Approximately 87% of the Lake Yale drainage basin and 77% of the Trout Lake drainage basin are located in unincorporated Lake County, with 23% of the Trout Lake drainage basin and 3% of the Lake Yale drainage basin located within a city jurisdiction.

TABLE 3-9

GOVERNMENTAL JURISDICTIONS IN CONTRIBUTING PORTIONS OF THE LAKE YALE AND TROUT LAKE DRAINAGE BASINS

WATERSHED	JURISDICTION	AREA (acres)	PERCENT OF TOTAL (%)
Lake Yale	Eustis	283.9	2
	Umatilla	198.3	1
	Lake County	13,372.4	87
	Marion County	1,544.6	10
	Total:	**15,399.2**	**100**
Trout Lake	Eustis	1,025.8	11
	Umatilla	1,096.6	12
	Lake County	7,264.9	77
	Total:	**9,387.3**	**100**

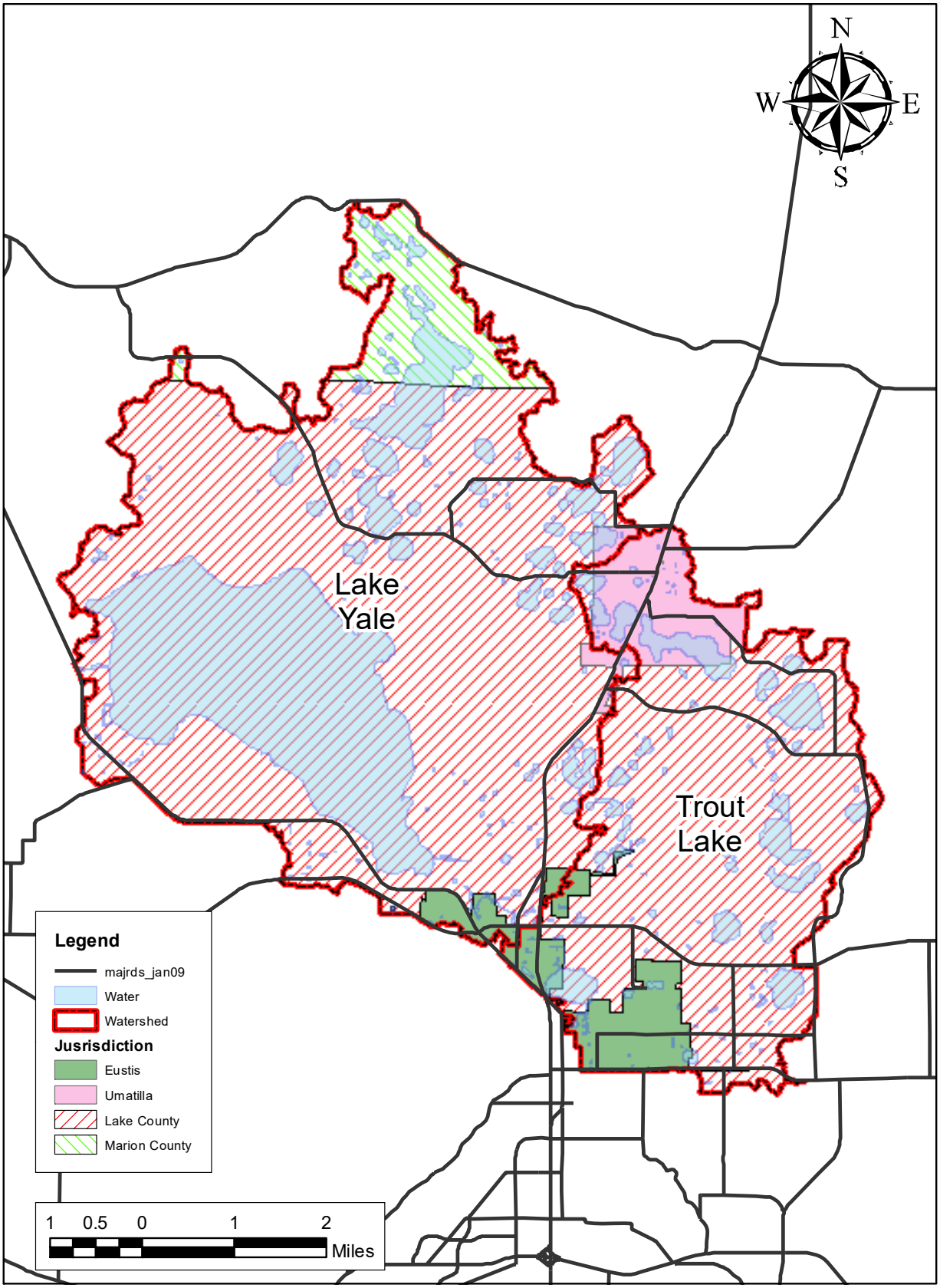


Figure 3-14. Governmental Jurisdictions in Contributing Portions of the Lake Yale and Trout Lake Drainage Basins.

3.5 Sewage Disposal

Disposal of sanitary sewage within contributing portions of the Lake Yale and Trout Lake drainage basins occur using a combination of on-site septic tanks and central sanitary sewer systems. Central sewer systems are currently provided for large portions of the cities of Eustis and Umatilla, but outside of these urban boundaries, disposal of sanitary sewage occurs primarily through on-site septic tanks. With the exceptions of small portions of the City of Eustis which extend into the Lake Yale drainage basin, sewage disposal for developed areas in the Lake Yale drainage basin occurs virtually entirely by on-site septic tank systems. Approximately 20% of the Trout Lake drainage basin is located within the cities of Eustis and Umatilla, with central sewer systems provided within most of these areas. However, approximately 80% of the Trout Lake basin uses individual septic tank systems for sewage disposal in developed areas.

3.6 Topography

Topographic information for contributing portions of the Lake Yale and Trout Lake drainage basins were obtained from Lake County and Marion County GIS layers. A topographic map for contributing portions of the two drainage basins is provided on Figure 3-15 based upon information contained in the Lake and Marion County databases. Contour elevations on Figure 3-15 range from approximately 55-60 (NAVD88) ft in perimeter portions of Lake Yale and Trout Lake to approximately 150 ft in southern portions of the Lake Yale drainage basin and southeastern portions of the Trout Lake drainage basin. However, the majority of perimeter portions of the two drainage basins have elevations of approximately 90-100 ft. This results in approximately a 30-40 ft gradient between the perimeter portions of the drainage basin and each of the two lakes, with the exception of the substantially steeper elevation gradient on the south side of Lake Yale.

Although not visible on Figure 3-15 due to the map scale, drainage basins for both Lake Yale and Trout Lake have numerous depressional areas consisting of upland areas with no positive outfall as well as lakes and wetlands which are depressed in the landscape and require significant inflow for a discharge to occur from the area. These areas were identified by ERD and comprise many of the minor sub-basin areas within each major sub-basin.

3.7 Stormwater Treatment

Watershed areas in the Lake Yale and Trout Lake drainage basins which currently receive stormwater treatment were identified by ERD using a combination of aerial photography, field reconnaissance, and a review of historical permitting records in the possession of SJRWMD. A summary of the results of this evaluation is given on Figure 3-16 which provides a listing of sub-basin areas with existing stormwater facilities. Parcels with existing stormwater treatment systems are located primarily in perimeter portions of the Lake Yale and Trout Lake drainage basins in areas with relatively recent development activity. Multiple stormwater BMP techniques were identified within the two drainage basins, and a summary of stormwater treatment techniques used in the Lake Yale and Trout Lake drainage basins is given in Table 3-10.

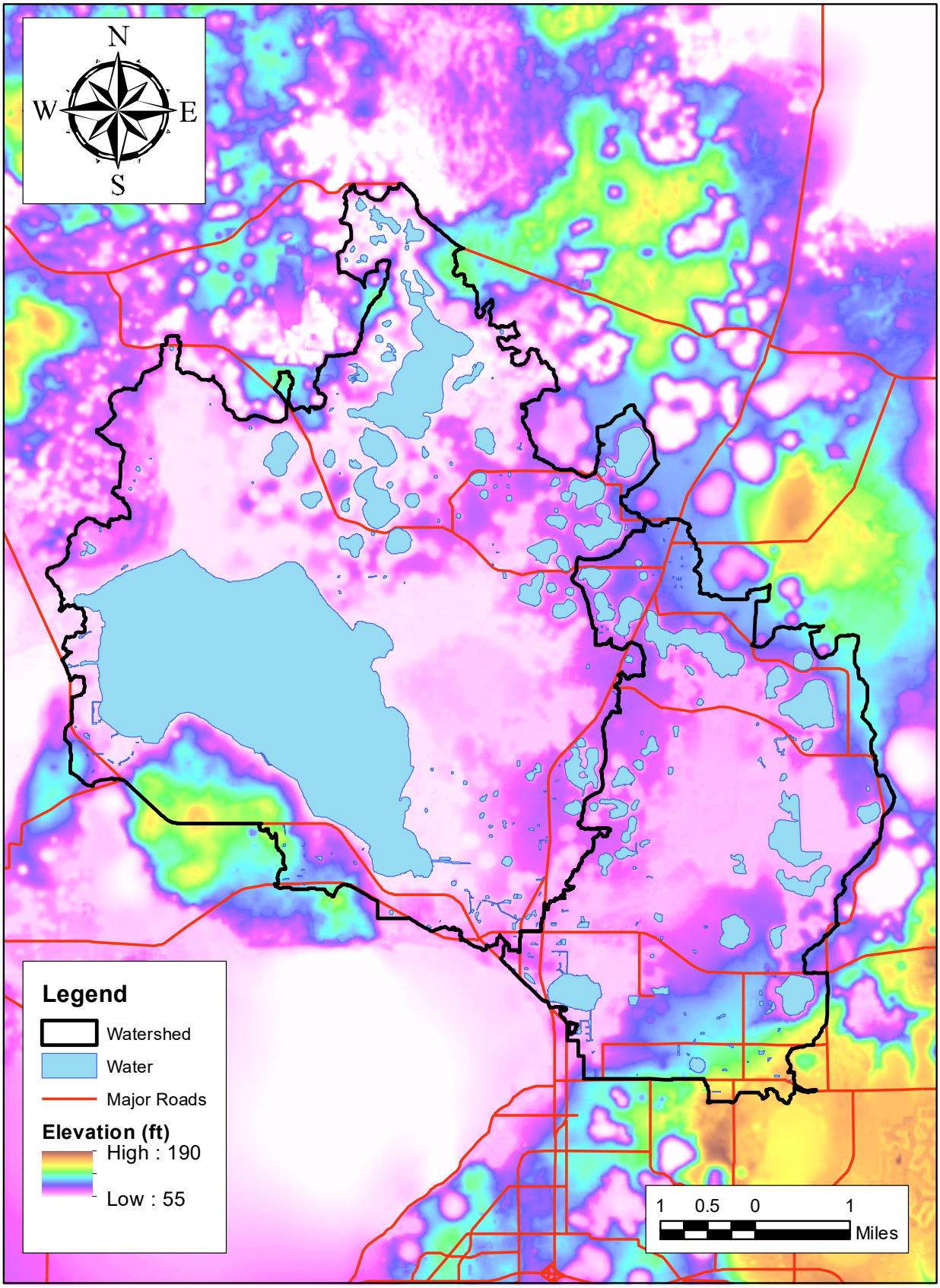


Figure 3-15. Topographic Map for Contributing Portions of the Lake Yale and Trout Lake Drainage Basins.

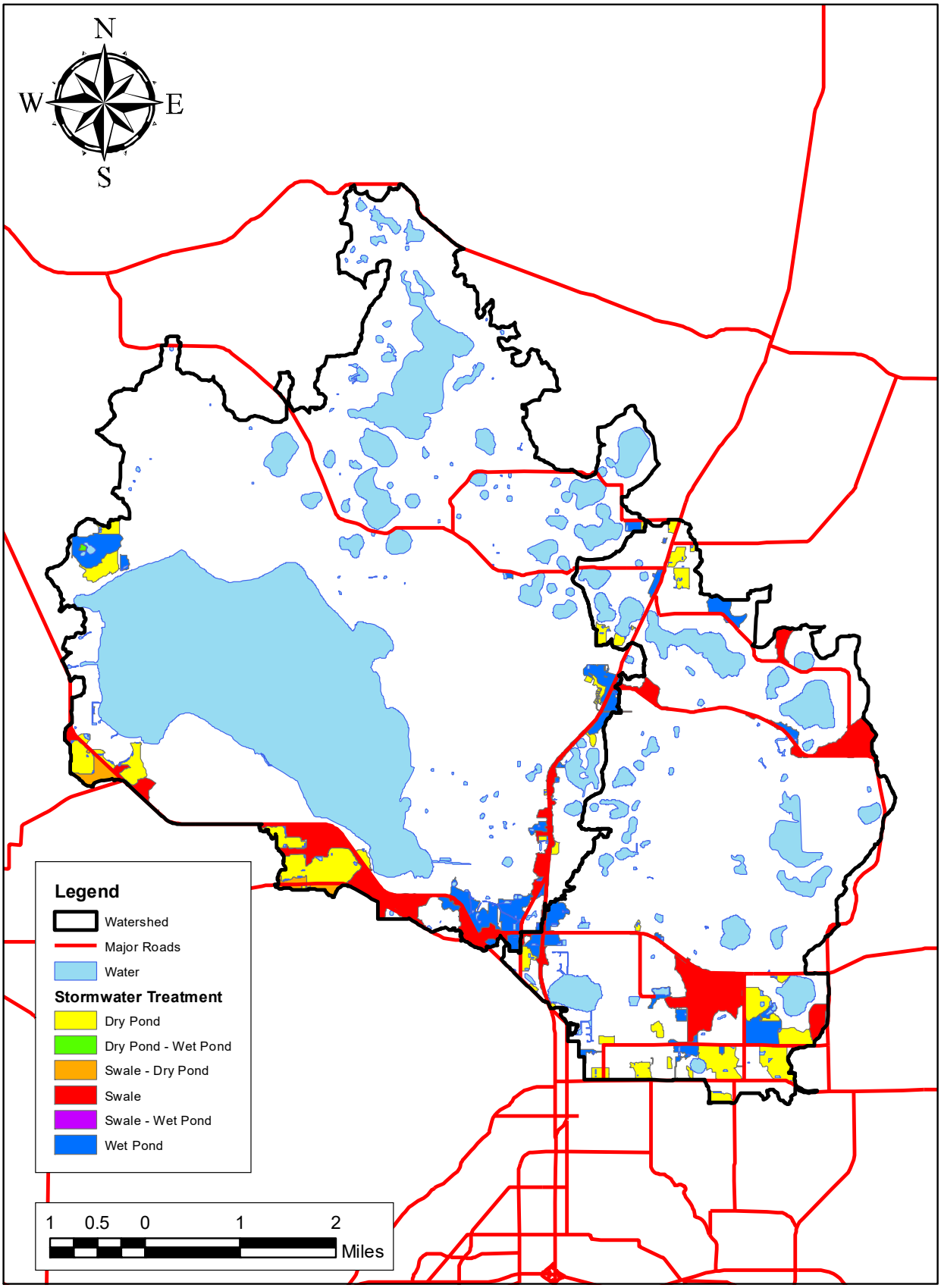


Figure 3-16. Areas with Existing Stormwater Treatment in the Lake Yale and Trout Lake Drainage Basins.

TABLE 3-10

STORMWATER TREATMENT IN THE LAKE YALE AND TROUT LAKE DRAINAGE BASINS

SUB-BASIN		SUB-BASIN AREAS WITH STORMWATER TREATMENT (acres)						TOTAL
		Dry Pond	Dry-Wet Pond	Swale	Swale-Dry Pond	Swale-Wet Pond	Wet Pond	
Lake Yale	LYW 01-01	24.1	--	42.9	--	--	87.3	154.3
	LYD 02-01	39.7	2.6	--	--	--	83.0	125.3
	LYD 03-01	18.6	--	--	--	--	--	18.6
	LYD 05-01	--	--	--	--	--	8.7	8.7
	LYD 12-01	--	--	--	--	--	9.9	9.9
	LYD 13-01	8.2	--	152.7	--	--	153.2	314.1
	LYD 14-01	--	--	16.4	--	--	11.3	27.7
	LYD 16-01	--	--	106.2	--	--	--	106.2
	LYD 17-01	47.1	--	4.2	--	--	--	51.3
	LYD 18-01	10.2	--	--	--	--	--	10.2
	LYD 19-01	133.9	--	117.5	38.7	--	--	290.1
	LYD 21-01	--	--	3.7	--	--	--	3.7
	LYD 26-01	--	--	2.6	--	--	--	2.6
	LYD 28-01	99.8	--	32.5	44.7	--	--	177.0
	LYD 33-01	6.9	--	12.2	--	--	--	19.1
	Direct	--	--	7.8	--	--	--	7.8
	Totals:	**389.3**	**2.6**	**499.5**	**83.4**	**0.0**	**353.4**	**1,328.2**
Trout Lake	Hicks Ditch	289.8	--	232.3	--	1.7	162.2	686.0
	TLW	23.2	--	272.3	--	--	67.1	362.6
	TL 01-02	10.9	--	5.8	--	--	--	16.7
	TL 02-01	--	--	2.2	--	--	--	2.2
	TL 07-01	92.0	--	--	--	--	39.0	131.0
	TL 09-01	1.5	--	--	--	--	--	1.5
	Totals:	**417.4**	**0.0**	**512.6**	**0.0**	**1.7**	**268.3**	**1,200.0**

The dominant stormwater treatment BMPs in the Lake Yale drainage basin appear to be dry ponds, swales, and wet ponds, with small portions of the drainage basin receiving treatment in a dual dry/wet pond system, along with dry ponds which receive swale pre-treatment. Dry ponds within the drainage areas (indicated by the yellow coloring on Figure 3-16) provide stormwater treatment primarily by infiltration of runoff into the soil and typically provide annual pollutant load reductions of 80% or more, depending upon the volume of the pond in relation to the contributing watershed area. Areas which provide stormwater treatment by wet detention systems (wet ponds) are highlighted in dark blue on Figure 3-16. These systems function similar to natural lakes and provide pollutant removal through a combination of physical, biological, and chemical processes. Pollutant removal efficiencies for wet ponds are typically 35-40% for total nitrogen and 60-70% for total phosphorus, although these efficiencies will vary depending upon the size of the permanent pool volume provided by the wet pond.

Swales are the largest single stormwater treatment BMP used in both the Lake Yale and Trout Lake drainage basins. Swales provide a dual benefit of conveying stormwater runoff while infiltrating a portion of the runoff into the soils and providing nutrient uptake through contact with vegetation and soils during travel through the swale. Swale drainage systems, even if not a permitted part of the overall stormwater management system, can provide significant pollutant attenuation on an annual basis, particularly when the swale is located in areas with soils in HSG A and B. Small portions of the Lake Yale and Trout Lake drainage basin are also treated by a combination of swale pre-treatment followed by either dry or wet ponds. These types of systems can be highly effective in reducing runoff loadings, particularly if a significant portion of the runoff volume is retained within the swale system.

Overall, approximately 1,328 acres of the Lake Yale drainage basin and 1,200 acres of the Trout Lake drainage basin have existing stormwater treatment facilities. As discussed in Section 3.2, approximately 17.4% of the Lake Yale drainage basin (2,679.5 acres) is covered by developed land use categories. Based on the estimated area of 1,328 acres with existing stormwater management systems, approximately 50% of the developed areas in the Lake Yale drainage basin have stormwater treatment systems. Approximately 24.4% of the Trout Lake drainage basin, 2,290.5 acres, is covered by developed land use categories. Based on the estimated area of 1,200 acres which currently receive stormwater treatment, approximately 52% of developed parcels in the Trout Lake drainage basin currently have stormwater treatment facilities.

3.8 Hydrologic Characteristics

Hydrologic characteristics were evaluated for each of the identified sub-basin areas discharging to Lake Yale and Trout Lake for use in hydrologic modeling to calculate annual runoff inputs to each lake. The hydrologic modeling, discussed in Section 4, is based upon the methodology developed by Harper and Baker (2007) which uses a modified SCS curve number methodology to calculate runoff volumes based upon the hydrologic characteristics of the drainage basin, including impervious area, directly connected impervious area (DCIA), and soil curve number values (CN values) to estimate runoff volumes for modeled storm events. Hydrologic characteristics of the sub-basin areas were determined for each of the identified land use types in each sub-basin area in both the Lake Yale and Trout Lake drainage basins.

3.8.1 Impervious Areas

Impervious areas were delineated using GIS for each land use category in each identified sub-basin to calculate the impervious area within each developed land use category and sub-basin area. This analysis also included an evaluation of citrus groves, nurseries, and recreational areas, which are not normally considered developed areas, since each of these land use categories contains impervious surfaces in one or more of the identified sub-basins. The impervious area was then expressed as a percentage of the total area for each identified land use type and sub-basin.

A summary of measured impervious area percentages for developed areas in the Lake Yale and Trout Lake drainage basins is given on Table 3-11. Citrus groves within the drainage basin areas exhibited only small areas of impervious surfaces which were generally less than 1% of the overall citrus grove area. Commercial areas within the Lake Yale drainage basin exhibited impervious percentages ranging from approximately 44-50%, with a slightly higher percentage of impervious surfaces for commercial areas in the Trout Lake basin which ranged from 51-94%. Industrial areas are characterized by highly variable impervious percentages in the Lake Yale drainage basin, ranging from 5-69%, with a more uniform impervious area percentage, ranging from 38-65%, in the Trout Lake drainage basin. A relatively high degree of variability was also observed in impervious percentages for institutional land use, particularly in the Lake Yale drainage basin, where impervious percentages for institutional areas ranged from approximately 8-44%.

Four separate categories of residential land use are identified in the land use data summarized in this report which include low-density residential, medium-density residential, mobile homes, and multi-family. Impervious percentages for low-density residential areas appear to be relatively uniform and low in value, ranging from 5-15% of the low-density area. Medium-density residential areas exhibit a somewhat higher degree of impervious surfaces, ranging from 14-40%. An even higher impervious percentage was observed for mobile homes which ranged from approximately 39-70%, with similar impervious percentages observed for multi-family areas.

Relatively low percent impervious values were observed for nurseries which ranged from <1-26%, although only two of the sub-basins where nurseries occur exhibited impervious percentages greater than 7%. Recreational areas also contained relatively small amounts of impervious surfaces, ranging from 0-17%.

Relatively high impervious percentages were observed for transportation land uses, with measured values ranging from approximately 16-52%, and the vast majority of measurements between 30-50%. Transportation land uses extend to the edges of the right-of-way area and include both the impervious roadway surfaces and pervious areas adjacent to the roadway.

3.8.2 Directly Connected Impervious Percentages

One of the parameters used in the SCS curve number methodology for estimating runoff volumes is the directly connected impervious areas (DCIA). DCIA reflects impervious surfaces which are hydraulically connected to the stormsewer or drainage system such that runoff generated on these impervious surfaces flow directly into the drainage system without first flowing over pervious surfaces. Runoff generated in these areas is assumed to discharge directly into the drainage system with losses occurring only as a result of initial abstraction on impervious surfaces.

A summary of measured directly connected impervious (DCIA) percentages in the Lake Yale and Trout Lake drainage basins is given in Table 3-12. Directly connected impervious areas were identified during the review of impervious surfaces within the drainage basins and identified as DCIA. The areas identified as DCIA are expressed as a percentage of the total overall drainage basin area, including both pervious and impervious areas. Overall, the percentage of drainage basins considered to be DCIA is extremely low in value for citrus groves, multi-family, nurseries, recreation, transportation, and utilities, with DCIA percentages for these categories typically less than approximately 2%. Slightly higher DCIA percentages were observed in some of the sub-basins for commercial, industrial, medium-density residential, and mobile homes. The DCIA percentages provided on Table 3-12 reflect relatively low values for this parameter, particularly for urban areas.

TABLE 3-11

MEASURED IMPERVIOUS AREA PERCENTAGES FOR DEVELOPED AREAS IN THE LAKE YALE AND TROUT LAKE DRAINAGE BASINS

LAKE	SUB-BASIN	IMPERVIOUS AREAS BY SUB-BASIN AND LAND USE (% of Total Area by Land Use)											
		Citrus Groves	Commercial	Industrial	Institutional	Low-Density Residential	Medium-Density Residential	Mobile Homes	Multi-Family	Nurseries	Recreation	Transportation	Utilities
Lake Yale	Lake Yale Slough	0	--	--	--	5.5	22.8	--	--	0.05	0	43.5	--
	LYW 01-01	0	44.4	68.8	43.9	7.7	18.0	38.9	--	23.7	6.5	45.9	3.8
	LYD 01-01	--	--	5.3	--	10.0	--	50.0	--	--	--	--	--
	LYD 02-01	--	45.5	8.7	--	5.1	--	45.2	--	--	0	40.0	--
	LYD 03-01	--	--	--	--	--	--	50.0	--	--	0	40.0	--
	LYD 04-01	--	--	--	--	5.0	--	50.0	--	--	--	40.0	--
	LYD 05-01	--	--	--	--	5.0	--	--	--	--	--	40.0	--
	LYD 06-01	--	--	--	--	5.0	--	--	--	--	--	40.0	--
	LYD 07a-01	--	--	--	--	5.0	--	--	--	--	--	--	--
	LYD 07b-01	0	--	--	--	14.9	--	--	--	--	0	--	--
	LYD 08-01	0	--	--	--	15.0	--	--	--	--	--	--	--
	LYD 11-01	--	--	--	--	5.0	14.0	--	--	--	--	--	--
	LYD 12-01	0.5	--	57.0	--	5.4	15.2	50.0	--	--	--	52.4	--
	LYD 13-01	0	49.9	26.8	44.1	7.7	24.7	45.3	32.7	--	8.4	39.7	--
	LYD 14-01	--	--	26.0	22.7	10.0	40.0	--	--	--	--	33.9	--
	LYD 16-01	0	--	46.1	--	5.0	34.1	--	--	--	--	32.6	--
	LYD 17-01	--	--	--	--	5.0	38.2	--	--	--	--	28.4	--
	LYD 18-01	--	--	--	--	--	39.4	--	--	--	--	28.5	--
	LYD 19-01	0	44.2	--	--	8.4	28.4	--	--	--	--	41.5	--
	LYD 20-01	0	--	--	--	5.2	--	--	--	1.9	--	50.0	--
	LYD 21-01	0	--	--	--	8.3	--	--	--	0.03	--	40.4	--
	LYD 22-01	0	--	--	--	7.1	--	--	--	2.0	--	50.0	--
	LYD 23-01	0	--	--	--	10.0	--	--	--	--	--	--	--
	LYD 24-01	0	--	--	--	5.0	--	--	--	--	--	--	--
	LYD 25-01	0	--	--	--	5.0	--	--	--	--	--	--	--
	LYD 26-01	0	--	--	--	--	--	--	--	2.0	--	28.5	--
	LYD 27-01	0	--	--	--	--	--	57.6	--	--	--	--	--
	LYD 28-01	0	--	--	--	5.0	21.0	44.0	--	--	--	28.3	--
	LYD 29-01	--	--	--	--	--	--	70.0	--	--	--	--	--
	LYD 30-01	--	--	--	--	--	--	70.0	--	--	--	--	--
	LYD 31-01	--	--	--	--	--	7.3	70.0	--	--	--	--	--
	LYD 32-01	--	--	--	--	--	18.5	--	--	--	--	--	--
	LYD 33-01	--	--	--	--	--	12.3	67.8	--	--	--	29.2	--
	LYD 34-01	--	--	--	25.8	--	--	--	--	--	--	--	--
	LYD 35-01	--	--	--	8.2	--	--	--	--	--	--	--	--
	LYD 36-01	--	--	--	12.3	15.0	--	43.0	--	--	--	24.1	--
	LYD 37-01	--	--	--	17.6	--	--	--	--	--	--	--	--
	LYD 38-01	--	--	--	29.5	5.0	--	--	--	--	--	--	--
	Direct	0	--	--	--	14.6	12.3	50.0	--	--	0	36.0	--
Trout Lake	Hicks Ditch	0.04	53.5	38.0	43.2	9.1	21.1	38.9	49.8	6.8	16.6	38.9	4.6
	Trout Wetland	0	66.6	65.2	17.9	9.8	20.5	45.0	47.0	25.8	6.9	39.5	0
	TL 01-02	--	51.1	--	55.8	--	33.7	--	45.0	--	--	37.5	--
	TL 02-01	--	--	--	--	15.0	--	45.0	--	--	--	39.7	--
	TL 03-01	--	--	--	--	15.0	--	40.0	--	--	--	--	--
	TL 04-01	--	--	--	--	--	--	45.0	--	--	--	--	--
	TL 05-01	--	93.9	--	--	--	--	44.8	--	--	--	--	--
	TL 07-01	--	55.9	41.8	54.1	6.6	24.3	--	50.6	--	16.0	51.6	0
	TL 08-01	--	59.7	--	--	10.0	20.0	--	--	--	--	47.9	--
	TL 09-01	--	62.7	--	--	--	--	--	--	--	--	16.0	--
	Direct	--	0	--	--	10.0	20.0	45.0	--	--	--	0	--

TABLE 3-12

MEASURED DIRECTLY CONNECTED IMPERVIOUS (DCIA) PERCENTAGES IN THE LAKE YALE AND TROUT LAKE DRAINAGE BASINS

LAKE	SUB-BASIN	DCIA AS A PERCENTAGE OF DRAINAGE BASIN AREA BY SUB-BASIN AND LAND USE (%)											
		Citrus Groves	Commercial	Industrial	Institutional	Low-Density Residential	Medium-Density Residential	Mobile Homes	Multi-Family	Nurseries	Recreation	Transportation	Utilities
Lake Yale	Lake Yale Slough	0	--	--	--	0	0	--	--	0	0	0	--
	LYW 01-01	0	1.5	33.1	5.8	0	0	0.5	--	0	0	3.7	0
	LYD 01-01	--	--	0	--	0	--	3.9	--	--	--	--	--
	LYD 02-01	--	0.6	0	--	0	--	21.2	--	--	0	0	--
	LYD 03-01	--	--	--	--	--	--	4.5	--	--	0	0	--
	LYD 04-01	--	--	--	--	0	--	0.4	--	--	--	0	--
	LYD 05-01	--	--	--	--	0	--	--	--	--	--	0	--
	LYD 06-01	--	--	--	--	0	--	--	--	--	--	0	--
	LYD 07a-01	--	--	--	--	0	--	--	--	--	--	--	--
	LYD 07b-01	0	--	--	--	0	--	--	--	--	0	--	--
	LYD 08-01	0	--	--	--	0	--	--	--	--	--	--	--
	LYD 11-01	--	--	--	--	0	0	--	--	--	--	--	--
	LYD 12-01	0	--	2.0	--	0	0	0	--	--	--	0	--
	LYD 13-01	0	6.1	0.3	0.7	0	3.3	12.8	0	--	0	0	--
	LYD 14-01	--	--	1.4	0	0	0	--	--	--	--	0	--
	LYD 16-01	0	--	0	--	0	0	--	--	--	--	0	--
	LYD 17-01	--	--	--	--	0	6.7	--	--	--	--	0	--
	LYD 18-01	--	--	--	--	--	2.0	--	--	--	--	0	--
	LYD 19-01	0	1.8	--	--	0	12.6	--	--	--	--	0	--
	LYD 20-01	0	--	--	--	0	--	--	--	0	--	0	--
	LYD 21-01	0	--	--	--	0	--	--	--	0	--	0	--
	LYD 22-01	0	--	--	--	0	--	--	--	0	--	0	--
	LYD 23-01	0	--	--	--	0	--	--	--	--	--	--	--
	LYD 24-01	0	--	--	--	0	--	--	--	--	--	--	--
	LYD 25-01	0	--	--	--	0	--	--	--	--	--	--	--
	LYD 26-01	0	--	--	--	--	--	--	--	0	--	0	--
	LYD 27-01	0	--	--	--	--	--	0	--	--	--	--	--
	LYD 28-01	0	--	--	--	0	0	0.5	--	--	--	0	--
	LYD 29-01	--	--	--	--	--	--	0	--	--	--	--	--
	LYD 30-01	--	--	--	--	--	--	0	--	--	--	--	--
	LYD 31-01	--	--	--	--	--	0	0	--	--	--	--	--
	LYD 32-01	--	--	--	--	--	0	--	--	--	--	--	--
	LYD 33-01	--	--	--	--	--	0	0	--	--	--	0	--
	LYD 34-01	--	--	--	0	--	--	--	--	--	--	--	--
	LYD 35-01	--	--	--	0	--	--	--	--	--	--	--	--
	LYD 36-01	--	--	--	0	0	--	0	--	--		0	--
	LYD 37-01	--	--	--	0	--	--	--	--	--	--	--	--
	LYD 38-01	--	--	--	0	0	--	--	--	--	--	--	--
	Direct	0	--	--	--	0	0	0.1	--	--	0	0	--
Trout Lake	Hicks Ditch	0	17.5	0	17.0	0	19.4	4.9	2.2	0	0	16.2	0
	Trout Wetland	0	16.6	0	0.1	0	6.1	0.5	2.0	0	0	0.5	0
	TL 01-02	--	0.3	--	0	--	2.7	--	1.7	--	--	0	--
	TL 02-01	--	--	--	--	0	--	0.3	--	--	--	0	--
	TL 03-01	--	--	--	--	0	--	1.2	--	--	--	--	--
	TL 04-01	--	--	--	--	--	--	1.7	--	--	--	--	--
	TL 05-01	--	0.8	--	--	--	--	5.1	--	--	--	--	--
	TL 07-01	--	3.1	1.6	1.3	0	19.0	--	2.1	--	0	5.1	0
	TL 08-01	--	0.4	--	--	0	0	--	--	--	--	0	--
	TL 09-01	--	0.8	--	--	--	--	--	--	--	--	0	--
	Direct	--	0	--	--	0	0	0	--	--	--	0	--

3.8.3 Curve Numbers

One of the most important parameters used by the SCS curve number methodology is the curve number (CN) value which is a variable parameter used to estimate runoff depths for modeled rain events based upon soil characteristics and land cover. A discussion of soil characteristics within the Lake Yale and Trout Lake drainage basins was provided in Section 3.3. The SCS curve number methodology assigns curve number values to each of the hydrologic soil groups discussed in Section 3.3 as a function of land cover for each soil type. Curve number values range from approximately 30-98 and reflect the runoff generating potential for a particular combination of soil type and land cover.

The hydrologic model used in this report conducts separate modeling for DCIA and non-DCIA areas. Runoff from DCIA areas is calculated as the rainfall-initial abstraction, while runoff from non-DCIA areas is calculated using a curve number value. A non-DCIA curve number reflects the area-weighted composite curve number for the existing land use and soil type combined with impervious areas that are not considered to be DCIA. A summary of calculated non-DCIA curve numbers in the Lake Yale and Trout Lake drainage basins is given on Table 3-13. Curve number values in the Lake Yale drainage basin appear to be on the lower end of the range of potential CN values for many of the developed drainage basin areas, particularly for citrus groves, low-density residential, and nurseries, compared with values for similar land uses observed in the Trout Lake drainage basin. Overall, due to differences in soil types and the degree of development, land uses in the Trout Lake drainage basin will generate proportionately larger runoff volumes than similar land uses in the Lake Yale drainage basin.

TABLE 3-13

CALCULATED NON-DCIA CURVE NUMBERS (CN VALUES) IN THE LAKE YALE AND TROUT LAKE DRAINAGE BASINS

LAKE	SUB-BASIN	NON-DCIA CURVE NUMBERS BY SUB-BASIN AND LAND USE											
		Citrus Groves	Commercial	Industrial	Institutional	Low-Density Residential	Medium-Density Residential	Mobile Homes	Multi-Family	Nurseries	Recreation	Transportation	Utilities
Lake Yale	Lake Yale Slough	44.9	--	--	--	50.3	52.4	--	--	50.3	40.4	65.4	--
	LYW 01-01	47.9	67.6	76.0	52.8	71.3	58.8	67.6	--	83.3	66.6	68.6	78.6
	LYD 01-01	--	--	42.1	--	48.5	--	58.7	--	--	--	--	--
	LYD 02-01	--	56.4	44.1	--	45.8	--	56.7	--	--	51.0	62.6	--
	LYD 03-01	--	--	--	--	--	--	58.7	--	--	58.0	62.6	--
	LYD 04-01	--	--	--	--	45.8	--	58.7	--	--	--	62.6	--
	LYD 05-01	--	--	--	--	45.8	--	--	--	--	--	62.6	--
	LYD 06-01	--	--	--	--	45.8	--	--	--	--	--	62.6	--
	LYD 07a-01	--	--	--	--	45.8	--	--	--	--	--	--	--
	LYD 07b-01	43.4	--	--	--	59.9	--	--	--	--	39.0	--	--
	LYD 08-01	43.1	--	--	--	67.8	--	--	--	--	--	--	--
	LYD 11-01	--	--	--	--	80.9	65.1	--	--	--	--	--	--
	LYD 12-01	55.4	--	74.5	--	80.5	57.0	79.5	--	--	--	69.8	--
	LYD 13-01	51.3	69.4	68.9	79.3	76.5	62.5	77.5	61.4	--	48.1	74.2	--
	LYD 14-01	--	--	70.4	52.4	48.5	62.6	--	--	--	--	65.9	--
	LYD 16-01	43.0	--	67.2	--	45.8	61.1	--	--	--	--	59.7	--
	LYD 17-01	--	--	--	--	45.8	53.0	--	--	--	--	55.8	--
	LYD 18-01	--	--	--	--	--	53.5	--	--	--	--	55.8	--
	LYD 19-01	43.0	44.8	--	--	47.6	49.9	--	--	--	--	63.5	--
	LYD 20-01	43.4	--	--	--	45.8	--	--	--	50.1	--	68.5	--
	LYD 21-01	43.0	--	--	--	47.8	--	--	--	49.0	--	62.8	--
	LYD 22-01	43.0	--	--	--	46.9	--	--	--	50.0	--	68.5	--
	LYD 23-01	43.0	--	--	--	48.5	--	--	--	--	--	--	--
	LYD 24-01	43.0	--	--	--	45.8	--	--	--	--	--	--	--
	LYD 25-01	43.0	--	--	--	45.8	--	--	--	--	--	--	--
	LYD 26-01	43.0	--	--	--	--	--	--	--	50.0	--	55.8	--
	LYD 27-01	43.0	--	--	--	--	--	73.8	--	--	--	--	--
	LYD 28-01	43.0	--	--	--	45.8	51.4	64.6	--	--	--	55.7	--
	LYD 29-01	--	--	--	--	--	--	82.3	--	--	--	--	--
	LYD 30-01	--	--	--	--	--	--	86.1	--	--	--	--	--
	LYD 31-01	--	--	--	--	--	80.8	87.3	--	--	--	--	--
	LYD 32-01	--	--	--	--	--	70.5	--	--	--	--	--	--
	LYD 33-01	--	--	--	--	--	65.7	79.9	--	--	--	56.2	--
	LYD 34-01	--	--	--	54.3	--	--	--	--	--	--	--	--
	LYD 35-01	--	--	--	53.1	--	--	--	--	--	--	--	--
	LYD 36-01	--	--	--	58.1	51.3	--	73.9	--	--	--	69.9	--
	LYD 37-01	--	--	--	49.8	--	--	--	--	--	--	--	--
	LYD 38-01	--	--	--	57.7	80.6	--	--	--	--	--	--	--
	Direct	43.2	--	--	--	64.4	48.9	58.7	--	--	46.3	60.2	--
Trout Lake	Hicks Ditch	45.6	63.7	61.4	58.0	59.2	55.3	55.0	60.7	77.1	53.7	62.4	58.9
	Trout Wetland	73.0	77.7	91.1	62.8	68.1	49.4	85.1	64.7	61.7	65.1	72.3	43.0
	TL 01-02	--	78.4	--	81.6	--	65.4	--	73.8	--	--	77.0	--
	TL 02-01	--	--	--	--	82.7	--	80.3	--	--	--	84.7	--
	TL 03-01	--	--	--	--	82.7	--	79.1	--	--	--	--	--
	TL 04-01	--	--	--	--	--	--	82.8	--	--	--	--	--
	TL 05-01	--	90.2	--	--	--	--	83.9	--	--	--	--	--
	TL 07-01	--	62.9	65.9	68.6	46.7	51.5	--	61.9	--	65.9	50.1	43.0
	TL 08-01	--	71.6	--	--	57.0	61.2	--	--	--	--	80.7	--
	TL 09-01	--	61.8	--	--	--	--	--	--	--	--	66.9	--
	Direct	--	61.0	--	--	68.3	69.0	71.8	--	--	--	61.0	--

SECTION 4

HYDROLOGIC INPUTS AND LOSSES

Average annual hydrologic budgets were developed for Lake Yale and Trout Lake which include inputs from direct precipitation, stormwater runoff, direct overland flow, and groundwater seepage. Hydrologic losses are estimated for evaporation, deep recharge, irrigation withdrawals (if applicable), and discharges from each of the lakes. The hydrologic budgets are used as input for development of nutrient budgets as well as estimation of hydraulic residence times. A conceptual schematic of evaluated hydrologic inputs and losses in Lake Yale and Trout Lake is given on Figure 4-1, and a discussion of identified hydrologic inputs and losses for Lake Yale and Trout Lake is given in the following sections. Each of the hydrologic budgets reflects long-term mean annual inputs and losses, and is not intended to represent any individual year.

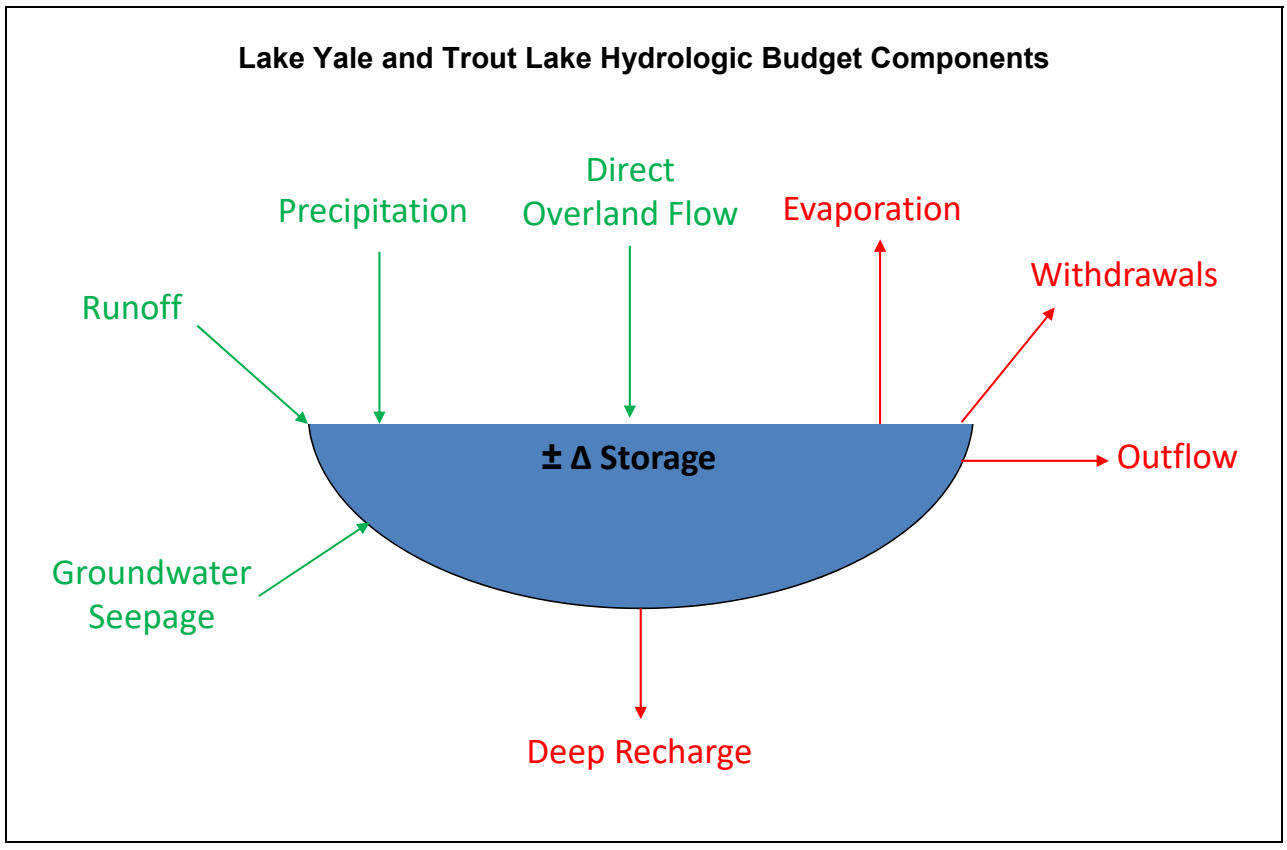


Figure 4-1. Conceptual Schematic of Evaluated Hydrologic Inputs and Losses to Lake Yale and Trout Lake.

4.1 Hydrologic Inputs

4.1.1 Direct Precipitation

4.1.1.1 Rainfall Characteristics

Hydrologic inputs from direct precipitation to Lake Yale and Trout Lake are calculated based upon historical mean monthly precipitation in the vicinity of the two lakes. The closest long-term National Weather Service (NWS) rainfall recording station is located in Lisbon, FL (Station No. 85076), approximately 2 miles southwest of Lake Yale and 6 miles west-northwest of Trout Lake. Estimates of mean monthly and annual precipitation were generated based upon historical monthly rainfall at the Lisbon meteorological station over the period from 1980-2010 which reflects the most current 30-year period of record available from NWS for this site.

A summary of mean monthly rainfall at the Lisbon meteorological station from 1980-2010 is given in Table 4-1. Mean monthly rainfall depths range from a low of 2.14 inches during November to a high of 7.18 inches in June, with an annual total of approximately 49.67 inches.

TABLE 4-1

SUMMARY OF MEAN MONTHLY RAINFALL AT THE LISBON, FL STATION FROM 1980-2010

MONTH	RAINFALL DEPTH (inches)	MONTH	RAINFALL DEPTH (inches)
January	2.94	July	5.86
February	2.76	August	7.14
March	4.23	September	6.06
April	2.74	October	2.87
May	3.28	November	2.14
June	7.18	December	2.47
		TOTAL:	**49.67**

4.1.1.2 Mean Annual Hydrologic Inputs

4.1.1.2.1 Lake Yale

Estimated mean monthly hydrologic inputs from direct precipitation into Lake Yale were calculated by multiplying the mean monthly rainfall measured at the Lisbon monitoring site (as summarized in Table 4-1) times the assumed lake surface area of 4,012 acres. A summary of estimated mean monthly hydrologic inputs to Lake Yale from direct precipitation is given in Table 4-2. During an average annual rainfall year, direct precipitation contributes approximately 16,607 ac-ft of water to Lake Yale.

TABLE 4-2

ESTIMATED MEAN MONTHLY HYDROLOGIC INPUTS TO LAKE YALE FROM DIRECT PRECIPITATION

MONTH	MONTHLY RAINFALL (inches)	HYDROLOGIC INPUTS[1] (ac-ft)	MONTH	MONTHLY RAINFALL (inches)	HYDROLOGIC INPUTS[1] (ac-ft)
January	2.94	983	July	5.86	1,959
February	2.76	923	August	7.14	2,387
March	4.23	1,414	September	6.06	2,026
April	2.74	916	October	2.87	960
May	3.28	1,097	November	2.14	715
June	7.18	2,401	December	2.47	826
			TOTALS:	**49.67**	**16,607**

1. Based on an assumed lake area of 4,012 acres

4.1.1.2.2 Trout Lake

Estimated mean monthly hydrologic inputs from direct precipitation into Trout Lake were calculated by multiplying the mean monthly rainfall measured at the Lisbon monitoring site (as summarized in Table 4-1) times the assumed lake surface area of 106 acres. A summary of estimated mean monthly hydrologic inputs to Trout Lake from direct precipitation is given in Table 4-3. During an average annual rainfall year, direct precipitation contributes approximately 439 ac-ft of water to Trout Lake.

TABLE 4-3

ESTIMATED MEAN MONTHLY HYDROLOGIC INPUTS TO TROUT LAKE FROM DIRECT PRECIPITATION

MONTH	MONTHLY RAINFALL (inches)	HYDROLOGIC INPUTS[1] (ac-ft)	MONTH	MONTHLY RAINFALL (inches)	HYDROLOGIC INPUTS[1] (ac-ft)
January	2.94	26.0	July	5.86	51.8
February	2.76	24.4	August	7.14	63.1
March	4.23	37.4	September	6.06	53.5
April	2.74	24.2	October	2.87	25.4
May	3.28	29.0	November	2.14	18.9
June	7.18	63.4	December	2.47	21.8
			TOTALS:	**49.67**	**439**

1. Based on an assumed lake area of 106 acres

4.1.2 Stormwater Runoff

Estimates of hydrologic inputs to Lake Yale and Trout Lake from stormwater runoff were calculated for each of the identified sub-basin areas listed in Tables 3-2 (Lake Yale) and 3-3 (Trout Lake) based upon mean average rainfall characteristics. Individual estimates of runoff inputs were generated for each of the 42 sub-basin areas (direct + overland flow) discharging to Lake Yale and 12 sub-basin areas discharging to Trout Lake, and are used for development of both hydrologic and nutrient budgets. Details of evaluation methods and results of the runoff modeling efforts are given in the following sections.

4.1.2.1 Computational Methods

Estimates of volumetric inputs from direct stormwater runoff were generated for each of the identified sub-basin areas discharging to Lake Yale and Trout Lake. As discussed in Section 3.1, many of the identified sub-basins contain multiple minor sub-basins due to the presence of depressional areas, waterbodies, or stormwater management systems which retain portions of the generated runoff volume. In these cases, runoff modeling was conducted separately for each of the minor sub-basins, and the individual minor sub-basin volumes were summed to calculate the total sub-basin runoff. The estimated runoff volumes were calculated for average annual rainfall conditions based upon the methodology developed by Harper and Baker (2007) which calculates rainfall-runoff relationships using a modification of the SCS curve number method based on directly connected impervious areas (DCIA) and curve number (CN values) for multiple combinations of hydrologic soil groups and land cover. The runoff estimates generated with this methodology reflect a long-term annual average and do not necessarily predict runoff during any given year.

The SCS methodology uses the hydrologic characteristics of the drainage basin, including impervious area, directly connected impervious area, and land use curve numbers to estimate runoff volumes for modeled storm events. Hydrologic characteristics of each sub-basin area were determined by ERD based upon aerial photography and a field reconnaissance of the watershed areas, and this information was discussed previously in Section 3. The methodology developed by Harper and Baker (2007) divides Florida into 5 meteorological zones with similar runoff generating potential, with Lake Yale and Trout Lake located in Zone 2 which includes much of the central Florida peninsula. The methodology provides rainfall-runoff relationships for each zone as a function of DCIA and non-DCIA CN values.

The Harper and Baker (2007) methodology is based on a long-term simulation model for all available meteorological recording sites in each of the 5 zones. The model simulation calculates a runoff depth for each rain event at each meteorological site, generally including more than 60 years of data, and an overall mean runoff coefficient (C value) is calculated for each combination of DCIA and non-DCIA CN values for the available runoff data at each meteorological site in each zone. The C values are calculated separately for various combinations of DCIA percentage and curve number, and the results from the individual meteorological sites are averaged together to obtain an overall mean C value for each combination of DCIA and CN value in each zone. Runoff C values for DCIA and CN values between the calculated combinations are obtained by iteration.

The modified SCS methodology developed by Harper and Baker calculates separate runoff volumes for the non-directly connected impervious area (non-DCIA) portion and the DCIA portion for each basin. Rainfall excess from the non-DCIA areas is calculated using the following set of equations:

$$nDCIA\ CN = \frac{[CN * (100 - IMP)] + [98\ (IMP - DCIA)]}{(100 - DCIA)}$$

$$Soil\ Storage\ (S) = \left(\frac{1000}{nDCIA\ CN} - 10 \right)$$

$$Q_{nDCIAi} = \frac{(P_i - 0.2S)^2}{(P_i + 0.8S)}$$

where:

	CN	=	curve number for pervious area
	IMP	=	percent impervious area
	DCIA	=	percent directly connected impervious area
	nDCIA CN	=	curve number for non-DCIA area
	P_i	=	rainfall event depth (inches)
	Q_{nDCIAi}	=	rainfall excess for non-DCIA for rainfall event (inches)

For the DCIA portion, rainfall excess is calculated using the following equation:

$$Q_{DCIAi} = (P_i - 0.1)$$

When P_i is less than 0.1, Q_{DCIAi} is equal to zero. The generated runoff volume from the non-DCIA areas and DCIA areas are added together to calculate the total runoff for a given rain event or minor sub-basin.

The methodology outlined above provides an estimate of the “generated” runoff volume from each individual rain event in each sub-basin over the available period of meteorological data. The sum of the total runoff was then divided by the number of years of data to obtain an estimate of the mean annual runoff volume. However, significant portions of the generated runoff volume may be attenuated during migration through stormwater management systems, waterbodies, and depressional areas within each sub-basin. If a stormwater management system is present which provides dry retention treatment, a large portion of the runoff volume may infiltrate into the ground and not reach the receiving water as a surface flow. If the stormwater system provides wet detention treatment or swales, a portion of the generated runoff volume may be lost due to evaporation from the water surface or infiltration into the soil.

The watershed models developed for Lake Yale and Trout Lake include information on the types of stormwater management systems within each sub-basin area and the amount of developed area treated by each stormwater management type. The runoff volume discharging to wet or dry stormwater treatment systems from contributing watershed areas is reduced or attenuated for likely volumetric removal processes in the wet or dry treatment systems. Estimates of the amount of generated runoff volume attenuated by each type of stormwater management system are summed in the model, and the attenuated volume is subtracted from the generated runoff volume within each sub-basin.

A summary of estimated volumetric removal efficiencies for stormwater management systems in the Lake Yale and Trout Lake drainage sub-basins is given in Table 4-4, based on previous research performed by ERD on the performance efficiencies of stormwater management systems used in the State of Florida. Developed areas treated by dry retention are assumed to have a volumetric loss of approximately 80% for runoff inputs due to infiltration and evaporation within the pond. Wet detention ponds are assumed to have a volumetric loss of approximately 20%, due primarily to evaporation and infiltration through the pond bottom. A volumetric retention loss of 20% is also assumed for roadside swales, regardless of whether or not the swale is part of a permitted stormwater system. Land-locked basin areas are assumed to retain 100% of the generated annual runoff in each basin. The information summarized in Table 4-4 is combined with information on stormwater management systems (Figure 3-10) to assist in calculation of runoff attenuation in each sub-basin area.

TABLE 4-4

ESTIMATED VOLUMETRIC REMOVAL EFFICIENCIES FOR STORMWATER MANAGEMENT SYSTEMS IN THE LAKE YALE AND TROUT LAKE DRAINAGE BASIN

SYSTEM TYPE	VOLUME REDUCTION (%)
Dry Pond	80
Wet Detention Pond	20
Land-Locked Basins	100
Swales	20

As discussed in Section 3.6, the drainage basin areas for both Lake Yale and Trout Lake contain numerous depressional areas which trap runoff and reduce the volume of runoff which actually reaches the two lakes. Significant depressional areas were delineated by ERD using the 1 ft LIDAR contour data and constitute many of the minor sub-basins within each major sub-basin.

Estimates of volumetric attenuation in depressional areas were included in the hydrologic model as a function of the depression depth. A summary of assumed attenuation percentages for depressional areas is given in Table 4-5. Depressional areas requiring a 1 ft increase in water level to begin discharging runoff are assigned a volumetric reduction of 15%. If the depressional area must increase by 2 ft to begin discharging runoff, then a 25% volumetric attenuation is assumed, increasing to 90% for a 6 ft depressional area, and 100% for areas of 7 ft or deeper. The hydrologic models for Lake Yale and Trout Lake incorporate these attenuation factors which are subtracted from the generated runoff similar to attenuation in stormwater management systems.

TABLE 4-5

ESTIMATED VOLUMETRIC ATTENUATION FOR DEPRESSIONAL AREAS IN THE LAKE YALE AND TROUT LAKE DRAINAGE BASINS

DEPRESSION DEPTH (ft)	VOLUMETRIC ATTENUATION LOSS (% of runoff)
0	0
1	15
2	25
3	50
4	65
5	80
6	90
7	100
8	100

As mentioned previously, the hydrologic runoff models for Lake Yale and Trout Lake reflect long-term hydrologic conditions spanning multiple decades. On an annual average basis, evaporation and rainfall on lakes and wetlands are approximately equal, so waterbodies and wetlands are assigned a C value of 0.00 in the model. The runoff volume generated upstream from the waterbody or wetland will pass through the lake or wetland without attenuation, but the waterbody and wetland are assumed to generate no net volume on an average annual basis.

The generated runoff volume represents the modeled runoff volume within each sub-basin prior to volume reduction in stormwater management systems, depressional areas, or wetlands. After subtracting the runoff losses, the resulting value represents the observed mean annual runoff volume which is actually discharged from each sub-basin to Lake Yale and Trout Lake. Estimates of the generated and observed runoff coefficients (C value) are also calculated for each drainage sub-basin.

The generated and observed runoff coefficients are calculated as follows:

$$\textit{Generated C Value} = \frac{\textit{Generated Runoff Volume (ac-ft)}}{\textit{Total Basin Area (ac) x Rainfall Depth (ft)}}$$

$$\textit{Observed C Value} = \frac{\textit{Observed Runoff Volume (ac-ft)}}{\textit{Total Basin Area (ac) x Rainfall Depth (ft)}}$$

4.1.2.2 Modeled Runoff Volumes

The modeling techniques summarized in the previous section were used to generate estimates of annual runoff volumes discharging to Lake Yale and Trout Lake on an average annual basis from each identified sub-basin area. The hydrologic models included both the major sub-basin areas (summarized in Section 3.1) as well as the minor sub-basin areas (referenced previously) within each of the major sub-basin areas. The minor sub-basins are used to allow separate attenuation calculations for areas that contain wetlands, waterbodies, stormwater management facilities, or depressional areas where additional or alternative treatment and attenuation mechanisms are present. A complete listing of the hydrologic runoff models developed for the Lake Yale and Trout Lake drainage basins is given in Appendix F, with the Lake Yale hydrologic model provided in Appendix F.1 and the Trout Lake hydrologic model provided in Appendix F.2.

4.1.2.2.1 Lake Yale

A tabular summary of modeled annual runoff volumes discharging to Lake Yale from the contributing drainage basin area is given on Table 4-6 for each of the 42 individual sub-basin areas which discharge to Lake Yale through culverts, pipes, channels, or direct overland flow. On an average annual basis, approximately 2,253 ac-ft of runoff is generated within the Lake Yale drainage basin. Of this amount, approximately 239 ac-ft/yr is retained in stormwater ponds and 560 ac-ft/yr retained in depressional areas, resulting in a net runoff inflow of approximately 1,455 ac-ft/yr to Lake Yale.

Based on the contributing watershed size of 15,399 acres, the observed runoff coefficient (C value) for the overall Lake Yale drainage basin is approximately 0.023 indicating that approximately 2.3% of the annual rainfall volume which falls in the watershed area actually reaches Lake Yale as stormwater runoff. This exceptionally low watershed C value is due to the large amount of relatively well drained soils within the basin which cover approximately 36.3% of the basin area. In addition, the Lake Yale drainage basin contains significant depressional waterbodies (such as Ella Lake) where water levels are typically 1-2 ft lower than water levels in Lake Yale, providing substantial water storage prior to discharge. The overall estimated runoff volume discharging to Lake Yale of 1,455 ac-ft/yr is equivalent to approximately 4.35 inches over the lake surface of 4,012 acres.

The single largest contributor of runoff inputs to Lake Yale is the Lake Yale Wetland sub-basin which is located on the east side of Lake Yale and contains multiple interconnected waterbodies. Overall, this sub-basin area contributes approximately 504 ac-ft/yr to Lake Yale, equivalent to approximately 34.6% of the total annual runoff inputs. A flow diagram for runoff discharges from the Lake Yale wetland sub-basin area is given on Figure 4-2. This figure illustrates each of the minor sub-basin areas within the Lake Yale wetland sub-basin and provides a cumulative accounting of runoff volumes during migration through the large sub-basin area. The overall net runoff coefficient for the Lake Yale wetland sub-basin is 0.029, indicating that approximately 2.9% of the annual rainfall which occurs in this sub-basin actually discharges to Lake Yale as stormwater runoff.

The second largest contributor of runoff inputs to Lake Yale is the Lake Yale Slough sub-basin. Although the Lake Yale Slough sub-basin is approximately 50% larger than the Lake Yale Wetland sub-basin, the slough sub-basin only contributes approximately 40% of the runoff volume generated in the Lake Yale Wetland sub-basin. A flow diagram for runoff discharges from the Lake Yale Slough sub-basin is given on Figure 4-3. Much of this runoff attenuation occurs in upstream portions of the sub-basin which contain areas discharging to Ella Lake. Overall, the Lake Yale Slough sub-basin contributes approximately 13.5% of the annual runoff inputs to Lake Yale. The observed runoff C value for the Lake Yale Slough sub-basin is 0.007 which indicates that approximately 0.7% of the annual rainfall volume which falls within this watershed area reaches Lake Yale as stormwater runoff on an average annual basis.

TABLE 4-6

MODELED ANNUAL RUNOFF VOLUMES DISCHARGING TO LAKE YALE

SUB-BASIN	AREA (acres)	GENERATED RUNOFF VOLUME (ac-ft/yr)	GENERATED RUNOFF C VALUE	VOLUME RETAINED IN SW PONDS (ac-ft/yr)	VOLUME RETAINED IN DEPRESSIONS (ac-ft/yr)	RUNOFF VOLUME TO LAKE (ac-ft/yr)	OBSERVED RUNOFF C VALUE	PERCENT OF TOTAL (%)
Lake Yale Slough	6,362.6	337	0.013	0.02	14	197	0.007	13.5
LYW 01-01	4,205.8	833	0.048	66.1	263	504	0.029	34.6
LYD 01-01	68.1	20.1	0.071	0.00	10.5	9.55	0.034	0.7
LYD 02-01	196.3	85.2	0.105	29.9	48.0	7.39	0.009	0.5
LYD 03-01	22.3	17.0	0.184	13.23	0.00	3.76	0.041	0.3
LYD 04-01	3.9	1.7	0.107	0.00	0.00	1.72	0.107	0.1
LYD 05-01	11.7	1.6	0.033	0.10	0.00	1.50	0.031	0.1
LYD 06-01	17.5	1.2	0.017	0.00	0.12	1.10	0.015	0.1
LYD 07a-01	75.3	3.9	0.012	0.00	0.67	3.21	0.010	0.2
LYD 07b-01	69.8	5.0	0.017	0.00	3.17	1.84	0.006	0.1
LYD 08-01	43.4	2.5	0.014	0.00	1.26	1.27	0.007	0.1
LYD 09-01	152.1	38.7	0.061	0.00	1.72	37.0	0.059	2.5
LYD 10-01	38.5	11.3	0.071	0.00	0.00	11.3	0.071	0.8
LYD 11-01	639.5	220	0.083	0.00	24.5	196	0.074	13.4
LYD 12-01	399.7	151	0.091	1.91	10.8	138	0.083	9.5
LYD 13-01	757.1	273	0.087	38.8	37.8	196	0.063	13.5
LYD 14-01	97.0	14.3	0.036	1.95	3.30	9.08	0.023	0.6
LYD 15-01	16.7	1.3	0.019	0.00	0.00	1.32	0.019	0.1
LYD 16-01	148.9	17.7	0.029	2.83	2.38	12.5	0.020	0.9
LYD 17-01	51.3	25.3	0.119	19.3	0.00	6.09	0.029	0.4
LYD 18-01	10.2	7.3	0.172	5.80	0.00	1.45	0.034	0.1
LYD 19-01	291.3	63.7	0.053	46.1	1.13	16.5	0.014	1.1
LYD 20-01	80.7	4.2	0.013	0.00	0.00	4.24	0.013	0.3
LYD 21-01	231.7	10.8	0.011	0.07	1.58	9.11	0.009	0.6
LYD 22-01	160.2	7.9	0.012	0.00	0.56	7.30	0.011	0.5
LYD 23-01	23.2	0.6	0.007	0.00	0.00	0.64	0.007	0.0
LYD 24-01	7.3	0.5	0.015	0.00	0.39	0.06	0.002	0.0
LYD 25-01	40.9	1.6	0.009	0.00	0.76	0.79	0.005	0.1
LYD 26-01	223.0	10.6	0.011	0.05	3.85	6.68	0.007	0.5
LYD 27-01	14.8	1.3	0.021	0.00	0.00	1.29	0.021	0.1
LYD 28-01	232.6	19.7	0.020	11.4	1.28	7.01	0.007	0.5
LYD 29-01	7.5	3.8	0.123	0.00	0.00	3.82	0.123	0.3
LYD 30-01	5.9	3.1	0.125	0.00	0.00	3.05	0.125	0.2
LYD 31-01	2.5	1.5	0.143	0.00	0.00	1.48	0.143	0.1
LYD 32-01	2.6	0.5	0.043	0.00	0.00	0.46	0.043	0.0
LYD 33-01	108.1	21.1	0.047	1.08	2.61	17.4	0.039	1.2
LYD 34-01	22.4	3.3	0.036	0.00	0.10	3.24	0.035	0.2
LYD 35-01	9.3	0.7	0.019	0.00	0.06	0.68	0.018	0.0
LYD 36-01	55.4	6.4	0.028	0.00	0.00	6.38	0.028	0.4
LYD 37-01	15.4	1.1	0.018	0.00	0.00	1.14	0.018	0.1
LYD 38-01	42.6	6.2	0.035	0.00	0.14	6.07	0.034	0.4
Direct	434.1	17.6	0.010	0.15	0.00	17.5	0.010	1.2
Totals:	**15,399.2**	**2,253**	**0.035**	**239**	**560**	**1,455**	**0.023**	**100.0**

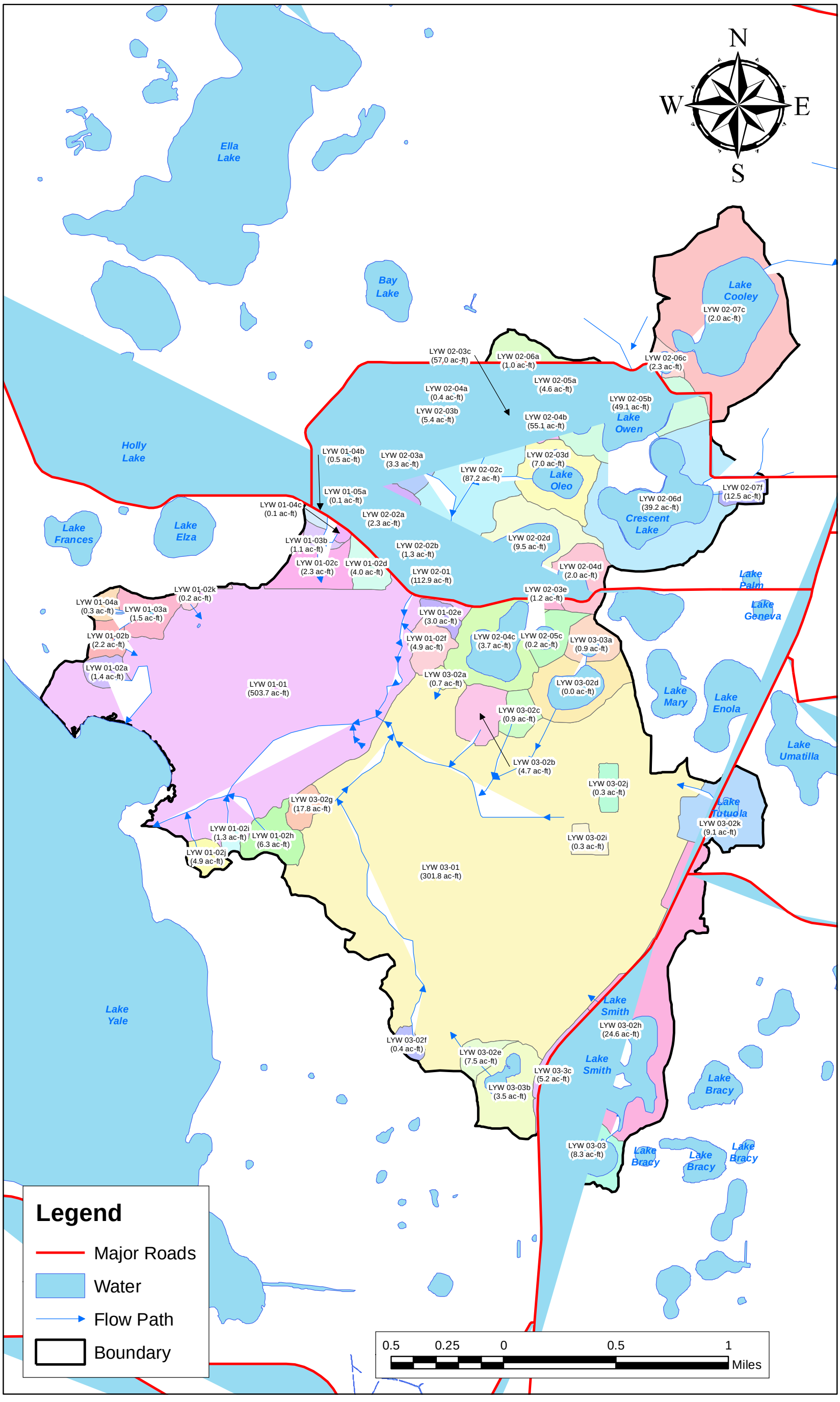


Figure 4-2. Flow Diagram for Runoff Discharges from the Lake Yale Wetland Sub-Basin.
(NOTE: All volumes are cumulative values).

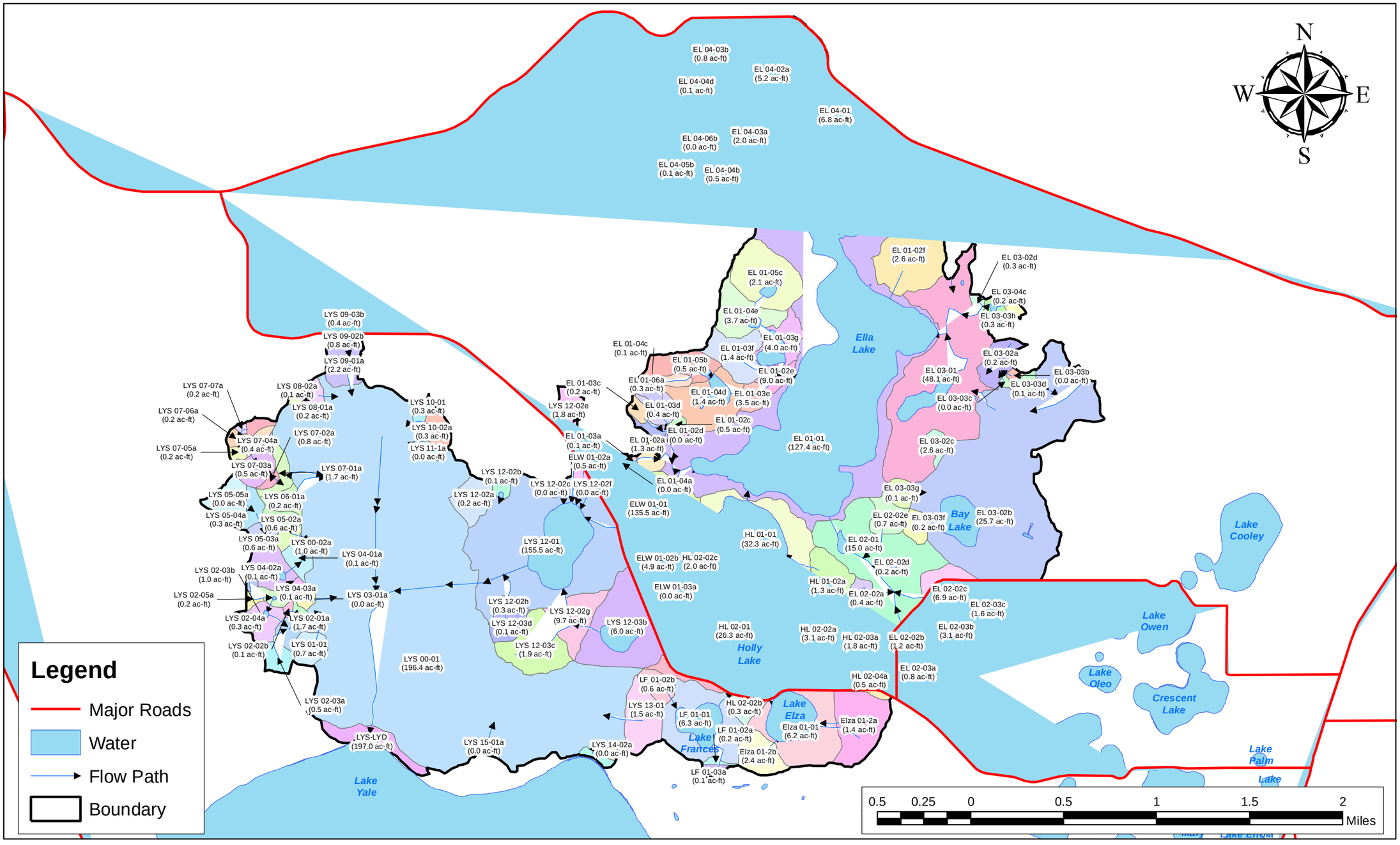


Figure 4-3. Flow Diagram for Runoff Discharges (ac-ft/yr) from the Lake Yale Slough Sub-basin. (NOTE: All volumes are cumulative values)

The third largest contributor of runoff inputs to Lake Yale is sub-basin 13-01. As indicated on Figure 3-3, this sub-basin is located on the southeast corner of Lake Yale and includes a series of interconnected canals and small tributaries. This sub-basin contributes approximately 196 ac-ft/yr to Lake Yale, with an observed annual runoff C value of approximately 0.063.

Approximately 13.4% of the annual runoff inputs to Lake Yale originate from sub-basin 11-01 which is a relatively large sub-basin area located on the east side of Lake Yale. This sub-basin contains multiple water features, canals, and tributaries which result in an observed annual runoff C value of 0.074.

Approximately 9.5% of the annual runoff inputs to Lake Yale originate within sub-basin 12-01 which contributes 138 ac-ft/yr of runoff to the lake. This area also has multiple canals, tributaries, and water features and has an effective runoff coefficient of 0.083.

Each of the remaining Lake Yale sub-basin areas contributes approximately 1% or less of the total runoff inputs to Lake Yale. Many of these areas are relatively small sub-basin areas which are located on the west and south side of Lake Yale and receive runoff from relatively small sub-basin areas.

4.1.2.2.2 Trout Lake

A tabular summary of modeled annual runoff volumes discharging to Trout Lake from the contributing watershed area is given on Table 4-7 for each of the 12 sub-basin areas which discharge to Trout Lake through defined channels, tributaries, canals, or diffuse overland flow. On an average annual basis, approximately 1,826 ac-ft of runoff is generated in the contributing drainage basin for Trout Lake, corresponding to a generated runoff C value of 0.047 for the overall basin area. However, portions of the generated runoff volume are retained in stormwater ponds, waterbodies, and depressional areas, resulting in a net input of runoff to Trout Lake of 1,201 ac-ft/yr, with an observed runoff C value of 0.031. This value indicates that approximately 3.1% of the total annual rainfall which occurs in the Trout Lake sub-basin area reaches Trout Lake as stormwater runoff. The relatively low volume of runoff generated within the Trout Lake drainage basin is due to the well drained soils which cover approximately 32% of the overall drainage basin area and the large number of wetlands and depressional areas which provide significant storage for generated runoff.

A flow diagram for runoff discharges from the Hicks Ditch sub-basin is given on Figure 4-4. This diagram provides cumulative runoff volumes for each of the minor sub-basin areas identified within the Hicks Ditch sub-basin. The estimated runoff input to Trout Lake of 772 ac-ft/yr reflects discharges from Hicks Ditch into the Trout Lake Wetland sub-basin. This analysis assumes that runoff inflows from Hicks Ditch into the wetland area ultimately pass through the wetland and discharge to Trout Lake with no significant volumetric loss.

The second most significant contributor of runoff inputs to Trout Lake is the Trout Lake Wetland, located on the north and east sides of Trout Lake. This area contributes approximately 247 ac-ft/yr of runoff to Trout Lake, equivalent to 20.5% of the annual inflows.

TABLE 4-7

MODELED ANNUAL RUNOFF VOLUMES DISCHARGING TO TROUT LAKE

SUB-BASIN	AREA (acres)	GENERATED RUNOFF VOLUME (ac-ft/yr)	GENERATED RUNOFF C VALUE	VOLUME RETAINED IN SW PONDS (ac-ft/yr)	VOLUME RETAINED IN DEPRESSIONS (ac-ft/yr)	RUNOFF VOLUME TO LAKE (ac-ft/yr)	OBSERVED RUNOFF C VALUE	PERCENT OF TOTAL (%)
Hicks Ditch	7,579.2	1,256	0.040	139	345	772	0.025	64.3
Trout Lake Wetland	1,102.4	325	0.071	40.2	38.5	247	0.054	20.5
TL 01-02	72.0	31.8	0.107	7.86	10.8	13.2	0.044	1.1
TL 02-01	16.0	7.25	0.109	0.29	0	6.96	0.105	0.6
TL 03-01	6.7	6.39	0.230	0.00	0	6.39	0.230	0.5
TL 04-01	8.5	8.85	0.252	0.00	0	8.85	0.252	0.7
TL 05-01	34.6	34.2	0.239	0.00	0	34.2	0.239	2.8
TL 06-01	22.7	0.28	0.003	0.00	0	0.28	0.003	0.0
TL 07-01	511.0	148	0.070	33.1	7.55	107	0.051	8.9
TL 08-01	30.6	4.49	0.035	0.00	0	4.49	0.035	0.4
TL 09-01	1.5	2.74	0.441	2.19	0	0.55	0.089	0.0
Direct	2.1	0.13	0.015	0.00	0	0.13	0.015	0.0
Totals:	**9,387**	**1,826**	**0.047**	**223**	**402**	**1,201**	**0.031**	**100.0**

The third most significant source of runoff inputs to Trout Lake is sub-basin 07-01 which is located on the south side of Trout Lake and discharges into the lake through a man-made canal system. This area contributes approximately 107 ac-ft/yr of runoff to Trout Lake, equivalent to 8.9% of the annual total.

The remaining 9 sub-basin areas reflect relatively minimal inputs of runoff to Trout Lake on an average annual basis. Runoff inflows from 8 of the 9 remaining sub-basins contribute approximately 1% or less of the total annual runoff inflow to the lake. Trout Lake sub-basin 05-01, which consists of a portion of the mobile home park located on the northwest shore of Trout Lake, contributes 2.8% of the annual runoff inflows.

4.1.3 Shallow Groundwater Seepage

Field investigations were performed by ERD to evaluate the quantity and quality of shallow groundwater seepage entering Lake Yale and Trout Lake during the monitoring period from May 2015-October 2016. Groundwater seepage was quantified using a series of underwater seepage meters installed at locations throughout each lake. Seepage meters provide a mechanism for direct measurement of groundwater inflow into a lake by isolating a portion of the lake bottom so that groundwater seeping up through the bottom sediments into the lake can be collected and characterized. Use of the direct seepage meter measurement technique avoids errors, assumptions, and extensive input data required when indirect techniques are used, such as the Gross Water Budget or Subtraction Method, as well as computer modeling and flow net analyses.

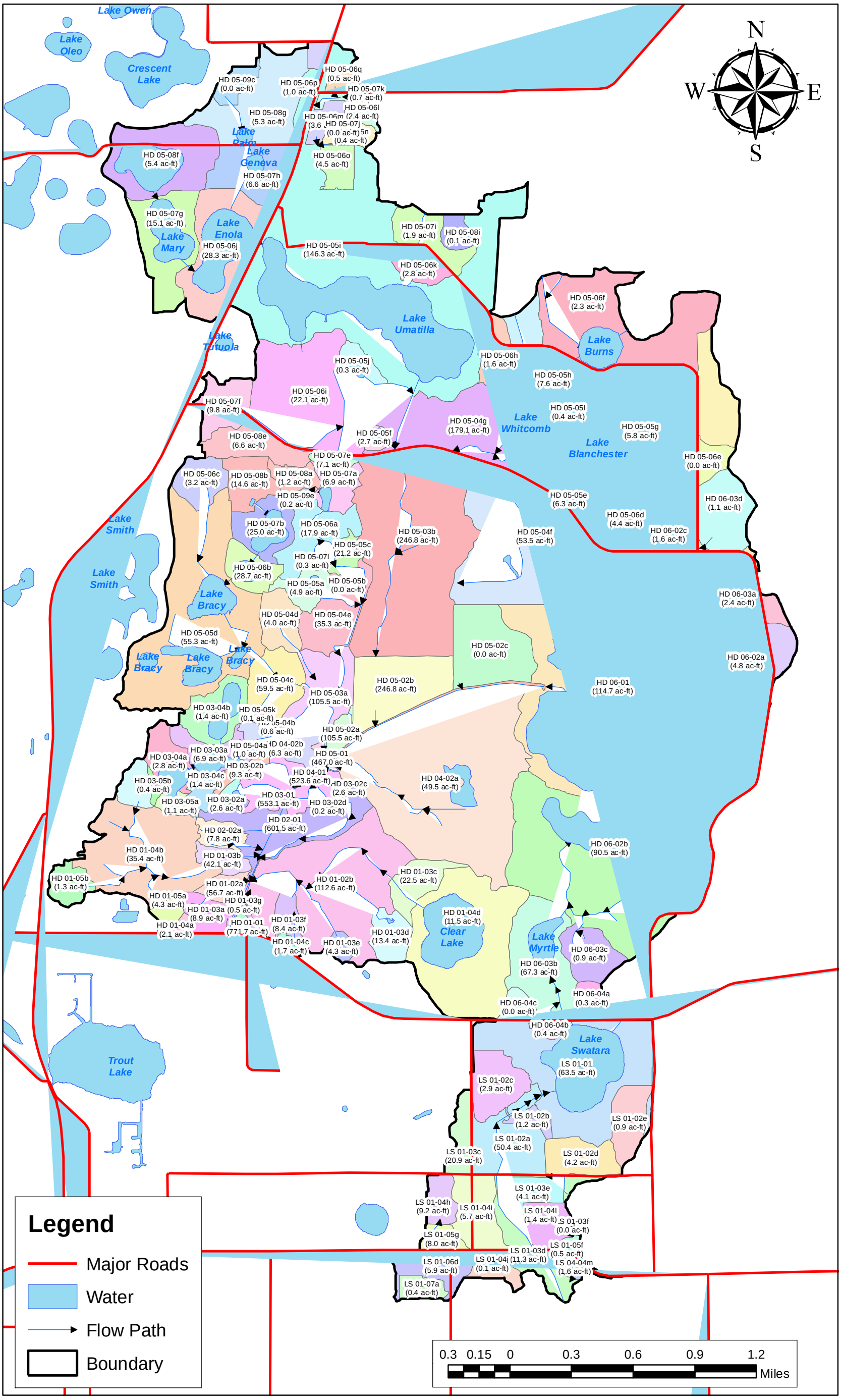


Figure 4-4. Flow Diagram for Runoff Discharges from the Hicks Ditch Sub-Basin. (NOTE: All volumes are cumulative values).

The seepage meter technique has been recommended by the U.S. Environmental Protection Agency (EPA) and has been established as an accurate and reliable technique in field and tank test studies (Lee, 1977; Erickson, 1981; Cherkauer and McBride, 1988; Belanger and Montgomery, 1992). With installation of adequate numbers of seepage meters and proper placement, seepage meters are a very effective tool to estimate groundwater-surface water interactions. One distinct advantage of seepage meters is that seepage meters can provide estimates of both water quantity and quality entering a lake system, whereas estimated methods can only provide information on water quantity.

4.1.3.1 Seepage Meter Construction and Locations

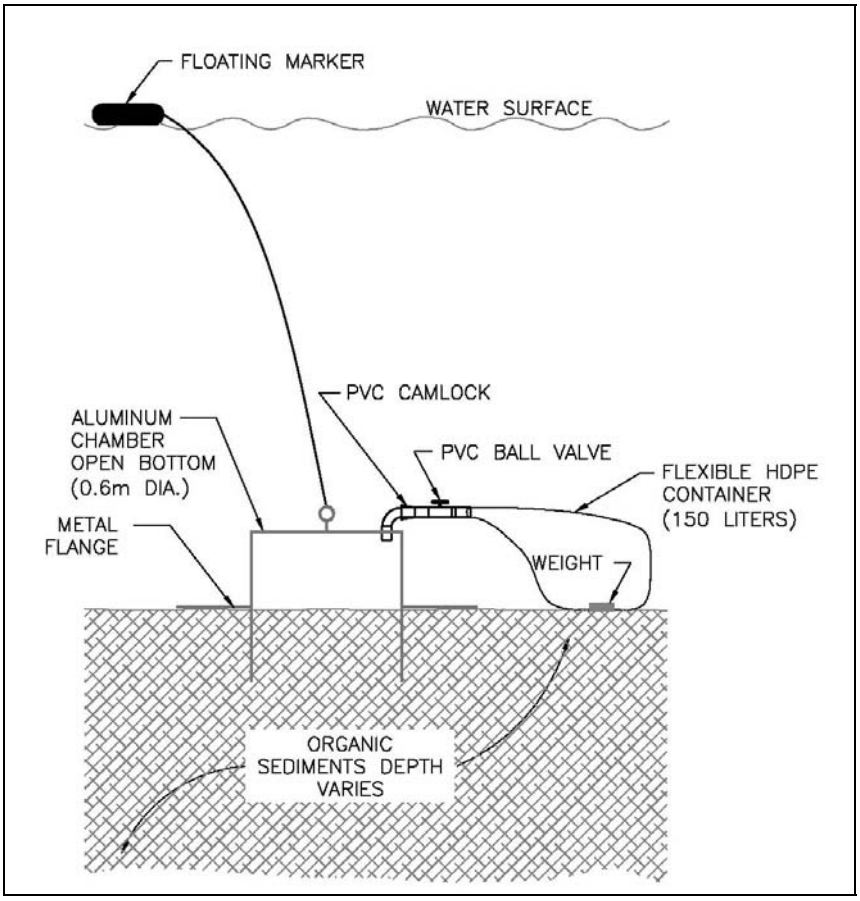
Schematics of typical seepage meter installations used in Lake Yale and Trout Lake are given in Figure 4-5. A photograph of seepage meters being prepared for deployment in Lake Yale and Trout Lake is given in Figure 4-6. Seepage meters were constructed from a 2-ft diameter aluminum cylinder with a closed top and open bottom. The seepage meters were inserted into the lake sediments to a depth of approximately 8-12 inches, isolating a sediment area of 3.14 ft^2. After installation, approximately 3-6 inches of water was trapped inside the seepage meter above the lake bottom.

A 0.75-inch PVC fitting was threaded into the top of each meter. The 0.75-inch PVC fitting was attached to a female quick-disconnect PVC Camlock fitting. A flexible polyethylene bag, with an approximate volume of 40 gallons, was attached to the seepage meter using a quick-disconnect PVC male Camlock fitting with a terminal ball valve. Each of the collection bags was constructed of black polyethylene to prevent light penetration into the bag which could potentially stimulate photosynthetic activity within the sample prior to collection and result in an alteration of the chemical characteristics of the seepage sample.

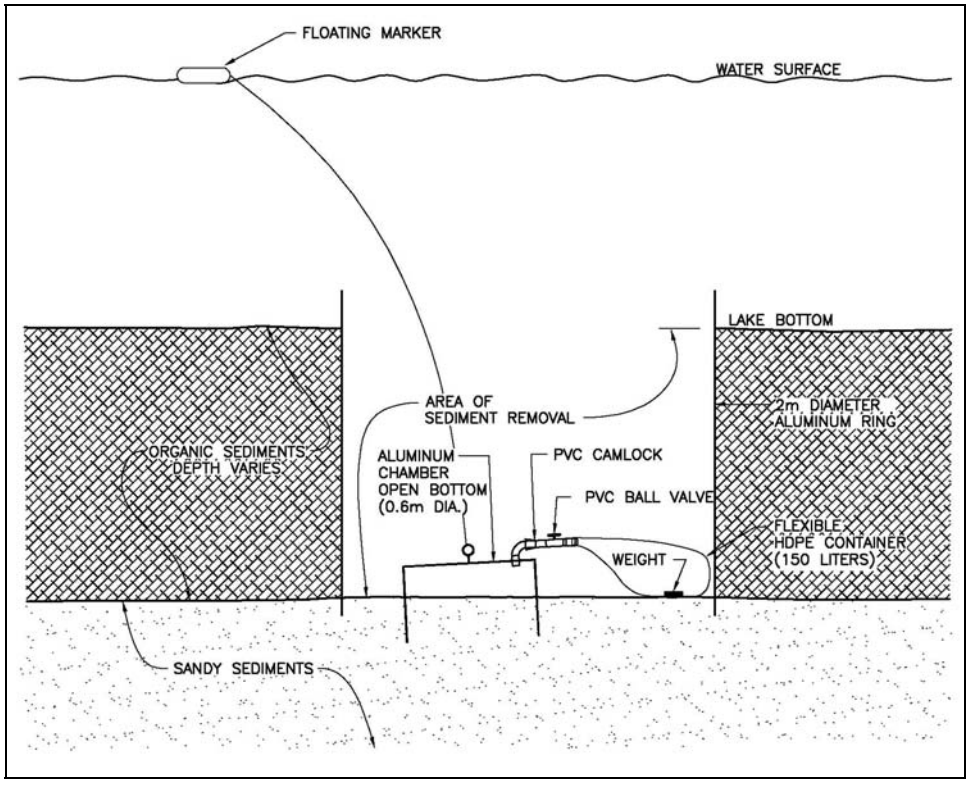
Prior to attachment to the seepage meter, all air was removed from inside the polyethylene collection bag, and the PVC ball valve was closed so that lake water would not enter the collection container prior to attachment to the seepage meter. A diver then connected the collection bag to the seepage meter using the PVC camlock fitting. After attaching the collection bag to the seepage meter, the PVC ball valve was then opened, and groundwater influx into the open bottom of the seepage meter is collected inside the flexible polyethylene bag.

Each seepage meter was installed with a slight tilt toward the outlet point so that any gases which may be generated inside the seepage meter would exit into the collection container. Two 10-ounce plastic-coated fishing weights were placed inside each of the collection bags to prevent the bags from floating up towards the water surface as a result of trapped gases. The location of each seepage meter was indicated by a floating marker in the lake which was attached to the seepage meter using a coated wire cable or by 2-inch PVC posts inserted around the perimeter.

Seepage meters were installed at 6 locations in Trout Lake on May 25, 2015, and at 18 locations in Lake Yale on June 4, 2015. Locations for the seepage meters in Lake Yale are indicated on Figure 4-7, with seepage meter locations for Trout Lake shown on Figure 4-8. Since seepage inflow is often most variable around the perimeter of a lake, the majority of the seepage meters were installed around the perimeter of the lakes at a uniform water depth of approximately 4-5 ft. Seepage meters were also installed in central portions of each lake.



a.
Seepage Meter Installed on Top of Existing Sediments



b.
Seepage Meter Installed in Area with Muck Sediment Removed

Figure 4-5. Typical Seepage Meter Installations.



Figure 4-6.

Seepage Meters Being Prepared for Installation in Lake Yale and Trout Lake.

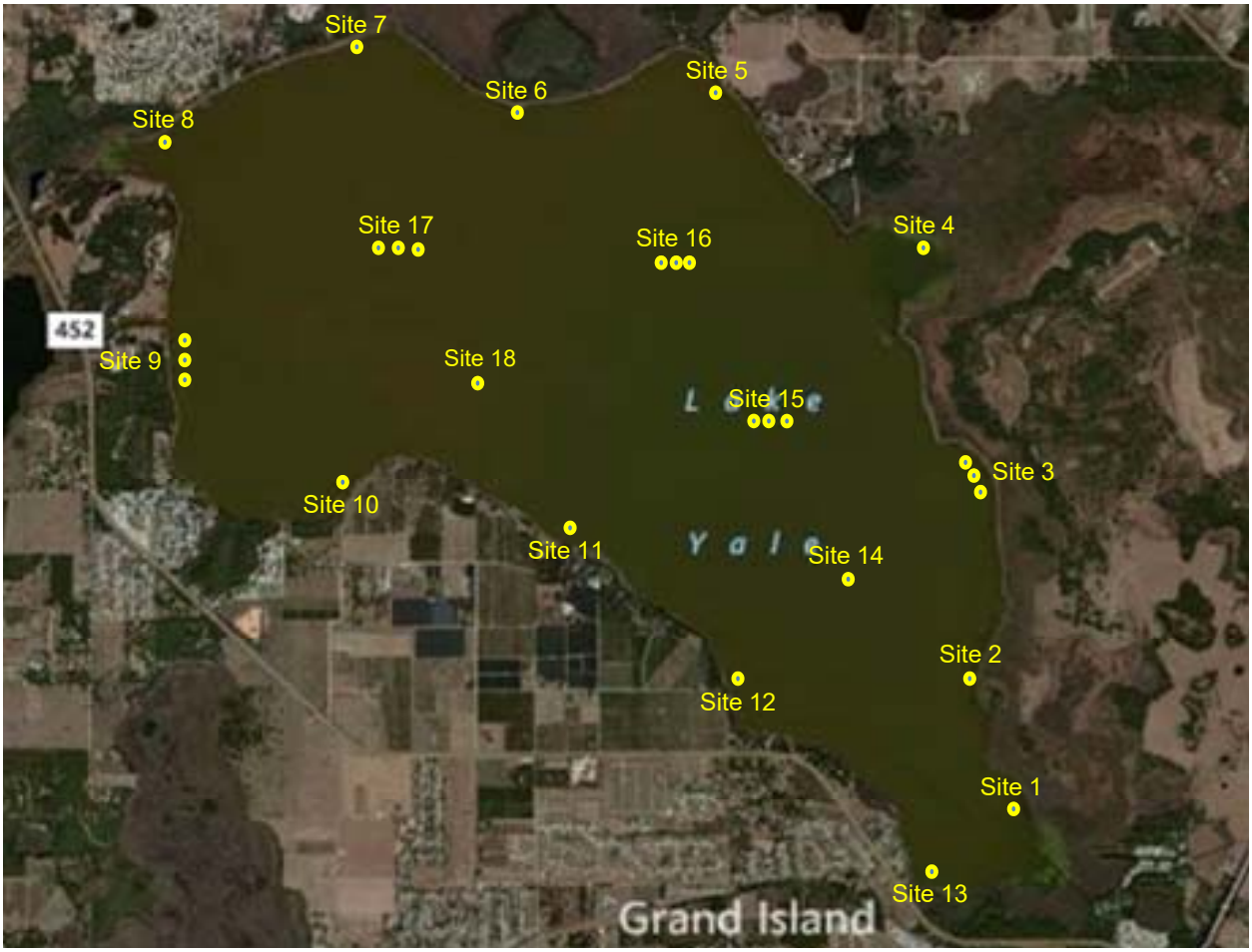


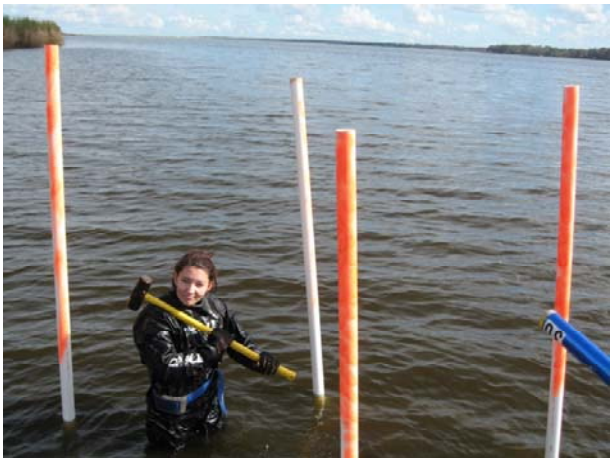
Figure 4-7. Seepage Monitoring Sites in Lake Yale.



Figure 4-8. Seepage Monitoring Sites in Trout Lake.

Triplicate sets of seepage meters were installed at 3 of the 6 locations in Trout Lake and at 5 of the 18 locations in Lake Yale. One of the triplicate seepage meters was installed in the normal manner on top of the existing sediments as illustrated on Figure 4-5a. A second seepage meter was installed adjacent to the first seepage meter in an area where the existing organic sediments had been removed, as illustrated on Figure 4-5b. A 2-meter diameter and 1-meter tall aluminum ring was inserted through the sediments and into the firm sandy bottom of the lake. The organic sediments were pumped from the interior of the cylinder using a 3-inch Mudhog-type pump. The seepage meter was then installed inside the chamber on the firm sandy sediments which form the original bottom of the 2 lakes. This protocol allowed a side-by-side comparison of the seepage characteristics collected in areas with and without the existing sediment accumulations.

Photographs of the installation process for the aluminum cylinders, including sediment removal, are given on Figure 4-9. The aluminum cylinder was inserted through the existing organic sediments and into the firm sand bottom using the blunt end of a 20-pound sledge hammer. The muck was then pumped from inside the chamber to expose the firm sand bottom of the lake. The organic material which was pumped from the cylinder consisted primarily of very fine flocculent particles which required a considerable amount of time to settle from the water column following pumping. When the installation was completed, each of the aluminum cylinders was marked using three to four 2-inch PVC posts to warn boaters of the potential hazard and to assist in locating the sites for collection of seepage samples.



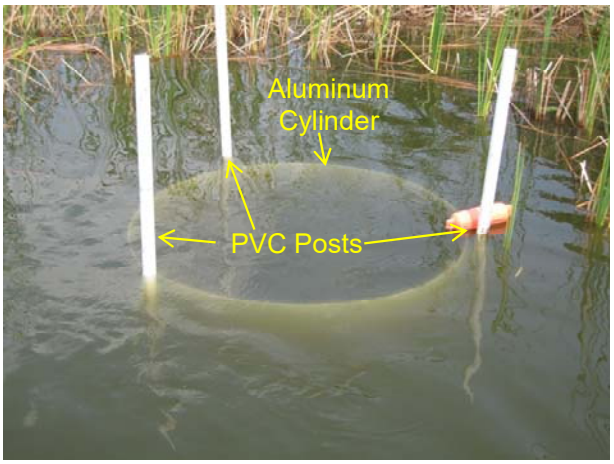
Cylinder inserted into sediments using sledge hammer



Muck is pumped from cylinder to firm bottom



Muck impacts on lake water



Completed installed chamber

Figure 4-9. Photographs of Installation of the Aluminum Cylinders and Sediment Removal.

The normal seepage meters installed in shoreline areas were inserted through the unconsolidated sediment layer into the consolidated sediments by repeatedly pounding around the perimeter of the meter using a 20-pound hammer weight until the seepage meter met significant resistance from the sediment material, and no additional movement of the meter was observed. Seepage meters installed in these areas were extremely stable, and additional settling of the seepage meters during the monitoring program was unlikely.

In central portions of the lake where the muck accumulations were deeper, the seepage meters were also inserted through the surficial unconsolidated sediments into the layer of consolidated sediments because the depth of sediments prevented the seepage meter from reaching the parent bottom material. If possible, the seepage meter was inserted until the top flange was even with the top of the consolidated sediment layer to achieve maximum stability for the seepage meter. The seepage meters installed on muck sediments in central portions of the lakes were less stable than the shoreline meters since the parent bottom material could not be reached. Each of the meters penetrated through the unconsolidated upper layer and into the consolidated sediment layer, which provided a relatively stable platform since the outer flange was resting on top of the consolidated layer. However, further limited settling of these meters over time cannot be ruled out.

In addition to the traditional seepage meters installed in areas with and without sediment contact, the third seepage meter installed at the multiple meter sites consisted of a seepage meter modified to measure benthic nutrient flux. A photograph of the apparatus used for these measurements is given in Figure 4-10. The benthic flux collection meter consists of a normal seepage meter with 3/8-inch internal ports threaded into the top of the meter to allow collection of small volume samples from the water volume isolated inside the meter. The outlet normally used for attachment of the seepage collection bag was capped so that only sediment diffusion occurred inside the benthic flux meter. These meters were installed as the third meter of the triplicate sets of seepage meter sites in the 2 lakes. The benthic flux collection meters were a new design developed by ERD to verify the laboratory-measured benthic sediment release experiments conducted on large core sediment samples collected from both lakes.

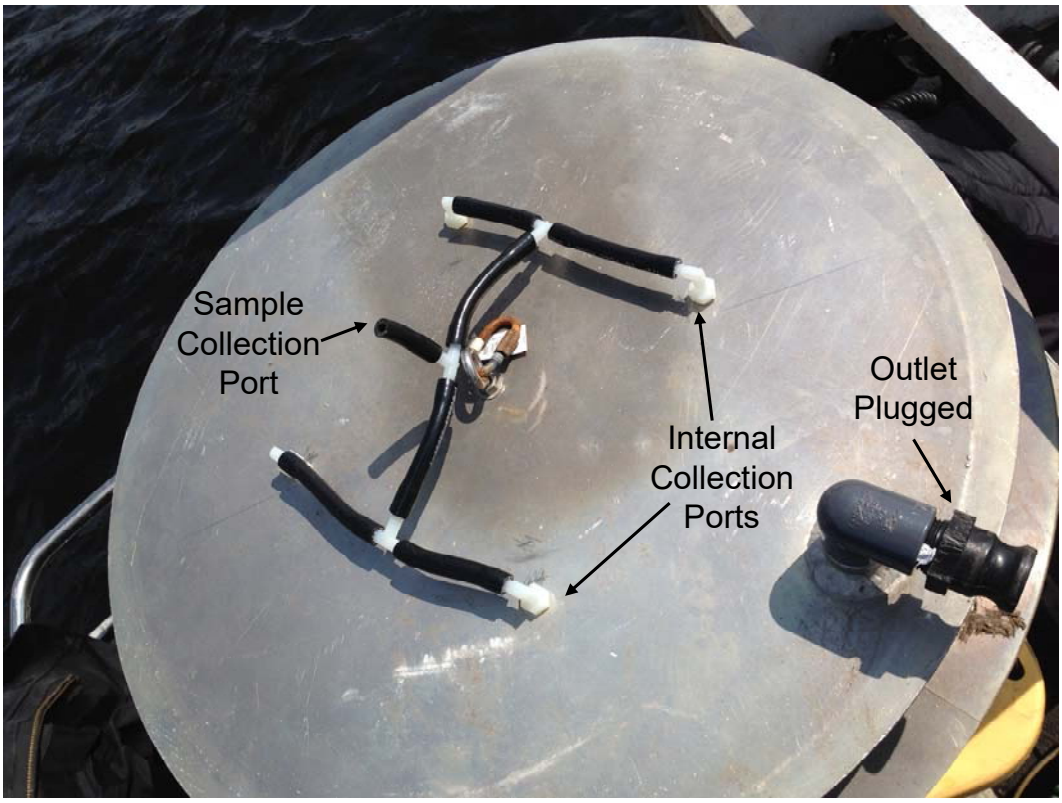


Figure 4-10. Benthic Flux Collection Meter.

Unfortunately, the relatively small 3/8-inch diameter internal collection ports which were threaded into the top of the seepage meter became plugged with sediments after approximately 1-2 months of sample collection at most sites. After the collection ports became clogged, collection of samples became extremely difficult, and little useable data were collected from these experimental flux meters.

4.1.3.2 Seepage Meter Monitoring

Polyethylene collection bags were attached at the time of installation to each of the seepage meters installed with and without existing sediments. The initial seepage monitoring events were conducted in Lake Yale and Trout Lake during July 2015, approximately 4-6 weeks following installation. During this event, the volume of seepage collected at each site was measured and recorded, but the collected sample was discarded since the initial sample represents a combination of seepage inflow and lake water trapped inside the seepage meter at the time of installation. Beginning with the second monitoring event, samples were retained for laboratory analyses. Each of the 9 seepage meters (with and without sediments) in Trout Lake and 23 seepage meters (with and without sediments) in Lake Yale was monitored on approximately a monthly to bi-monthly basis from June 2015-October 2016, with shorter event intervals during wet season conditions and longer event intervals during dry season conditions. Seepage monitoring events were conducted during the months of July, August, September, December, February, April, June, and October. Ten separate seepage monitoring events were conducted for evaluation of quantity and quality at each of the monitoring sites. The seepage meters were removed at the end of the monitoring program in October 2016.

4.1.3.3 Seepage Inflow

A summary of field measurements of seepage inflow to Lake Yale and Trout Lake from May 2015-October 2016 is given in Appendix G, with field measurements collected in Lake Yale provided in Appendix G.1 and measurements collected in Trout Lake provided in Appendix G.2. During collection of the seepage samples, information was recorded on the date and time of sample collection, the volume of seepage collected at each site, general observations regarding the condition of the seepage collection bags, and replacement/repair details. The seepage inflow rate at each location is calculated by dividing the total collected seepage volume (liters) by the area of the seepage meter (0.27 m^2) and the time (days) over which the seepage sample was collected. Field data are provided for seepage meters collected with and without contact with existing sediments.

As seen in Appendix G, a number of seepage meter sites in both Trout Lake and Lake Yale contain missing data for one or more events during the field monitoring program as a result of missing or damaged collection bags and damaged or missing seepage meters. A total of 10 seepage field monitoring events was conducted in each of the 2 lakes, with a potential of 60 field measurements in Trout Lake at the 6 “normal” seepage monitoring sites, and 180 potential seepage monitoring events at the 18 “normal” seepage meter sites in Lake Yale. These data include only seepage samples collected with sediment contact.

The most significant loss of seepage samples occurred in Lake Yale where approximately one-third of the potential seepage data were lost due to missing or damaged seepage meter systems. Loss of seepage data was particularly a problem in central portions of Lake Yale, where the centrally located seepage meters appeared to be deliberately damaged or removed throughout the field monitoring program. Each of the centrally located seepage meters in Lake Yale were replaced by ERD on multiple occasions, but in most cases, the newly installed seepage meters were missing by the time of the next monthly monitoring event. At the centrally located seepage meters in Lake Yale, identified by sites 14-18, a total of 20 seepage meter samples were collected out of a potential 50 samples at these sites. Loss and damage of seepage meters was much less of an issue in Trout Lake due to the relatively limited boating activities within the lake.

4.1.3.3.1 Lake Yale

A summary of mean seepage inflow measurements collected in Lake Yale at each of the 18 regular seepage meter monitoring sites is given in Table 4-8. Mean seepage values measured at the Lake Yale monitoring sites ranged from 0.42-1.31 liters/m^2-day, with a majority of measured values ranging from approximately 0.5-1 liters/m^2-day. A similar degree of variability was observed in the measured minimum and maximum seepage influx rates during the field monitoring program.

TABLE 4-8

SUMMARY OF HYDROLOGIC INPUTS TO LAKE YALE FROM GROUNDWATER SEEPAGE

SITE	NUMBER OF SAMPLES	SEEPAGE (liters/m^2-day)		
		Minimum	Maximum	Mean
1	10	0.19	1.37	0.52
2	7	0.33	1.57	0.54
3	7	0.59	1.71	0.92
4	9	0.24	1.05	0.42
5	8	0.33	1.72	1.10
6	8	0.46	2.82	1.10
7	6	0.29	1.96	0.68
8	9	0.50	2.30	0.90
9	8	0.34	1.76	0.81
10	7	0.51	1.81	0.88
11	6	0.51	6.31	1.27
12	9	0.20	2.28	0.92
13	6	0.19	2.94	0.92
14	4	0.69	1.75	1.31
15	6	0.30	1.69	0.64
16	5	0.20	1.92	0.55
17	4	0.21	1.39	1.01
18	1	0.56	0.56	0.56
Total:	**120**			

The mean seepage values summarized on Table 4-8 were combined with the geographic coordinates for each site to generate an isopleth contour map for mean seepage inflow into Lake Yale using the AutoDesk Land Desktop 2007 Module for AutoCad. Isopleths of mean seepage inflow to Lake Yale are given on Figure 4-11. The range of seepage values indicated on this figure is from 0.6-1.2 liters/m^2-day, with the vast majority of measurements less than 1 liter/m^2-day.

The most elevated levels of seepage influx were observed along the northern, western, and central-southeastern portions of Lake Yale, with the lowest seepage influx observed in eastern, central, and extreme southeastern areas.

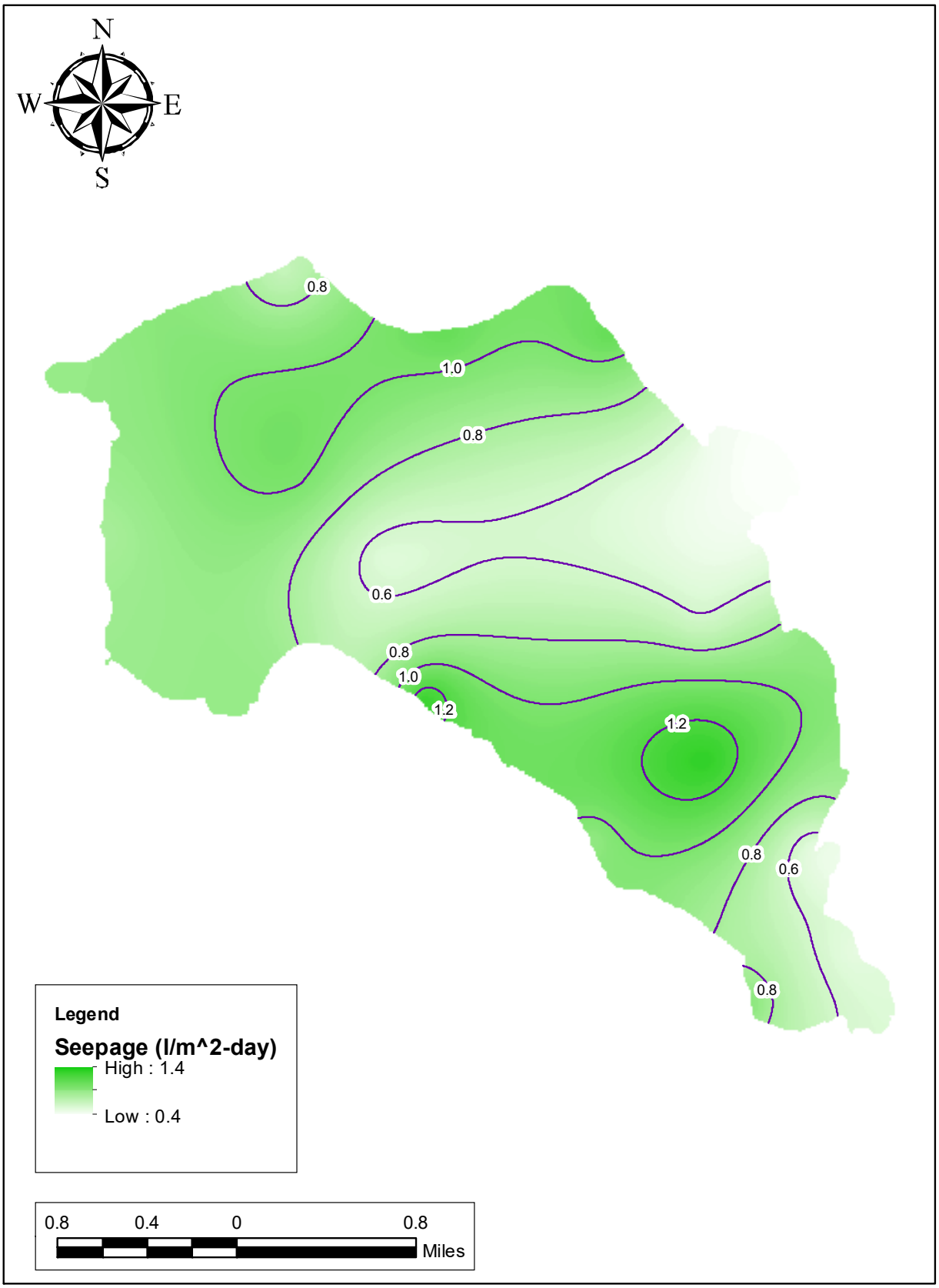


Figure 4-11. Isopleths of Mean Seepage Inflow to Lake Yale from June 2015-October 2016.

The seepage isopleths indicated on Figure 4-11 were graphically integrated to obtain estimates of mean daily seepage influx into Lake Yale. A summary of the results of this analysis is given in Table 4-9. The mean seepage influx to Lake Yale during the field monitoring program was 0.84 liters/m^2-day, which is equivalent to approximately 11.1 ac-ft/day or 4,038 ac-ft/yr.

TABLE 4-9

ESTIMATED MEAN SEEPAGE INFLOW TO LAKE YALE FROM JUNE 2015 – OCTOBER 2016

PARAMETER	UNITS	VALUE
Lake Area	acres	4,012
Mean Seepage Inflow	liters/m^2-day ac-ft/year	0.84 4,038
Seepage/Surface Area Ratio	ft/yr	1.01

The calculated seepage/surface area ratio is provided in the final row of Table 4-9. This value provides an estimate of seepage inflow in terms of a depth over the entire lake surface and provides a method for comparing relative seepage inflow between lakes without consideration of lake area. During the field monitoring program, seepage inflow into Lake Yale contributed a water volume equivalent to 1.01 ft over the entire surface area of the lake, slightly lower than the mean seepage loading rates measured by ERD in other Central Florida lakes. The seepage inflow listed on Table 4-9 is used in subsequent sections for development of an overall hydrologic budget for the lake.

4.1.3.3.2 Trout Lake

A summary of mean seepage inflow measurements collected in Trout Lake at each of the regular seepage meter monitoring sites is given in Table 4-10. Mean seepage values measured at the 6 monitoring sites in Trout Lake ranged from 0.64-1.25 liters/m^2-day, with a majority of measured values ranging from approximately 0.6-1.1 liters/m^2-day. Seepage influx to Trout Lake was highly variable throughout the year, with approximately an order or magnitude difference between minimum and maximum measured seepage influx rates for some sites.

The mean seepage values summarized on Table 4-10 were combined with the geographic coordinates for each seepage monitoring site to generate an isopleth contour map for mean seepage inflow into Trout Lake using the AutoDesk Land Desktop 2007 Module for AutoCad. Isopleths of mean seepage inflow to Trout Lake during the field monitoring program from June 2015-October 2016 are given on Figure 4-12. The range of seepage values indicated on this figure is from 0.8-1.2 liters/m^2-day, with the vast majority of the seepage influx rates ranging from 0.8-1 liter/m^2-day.

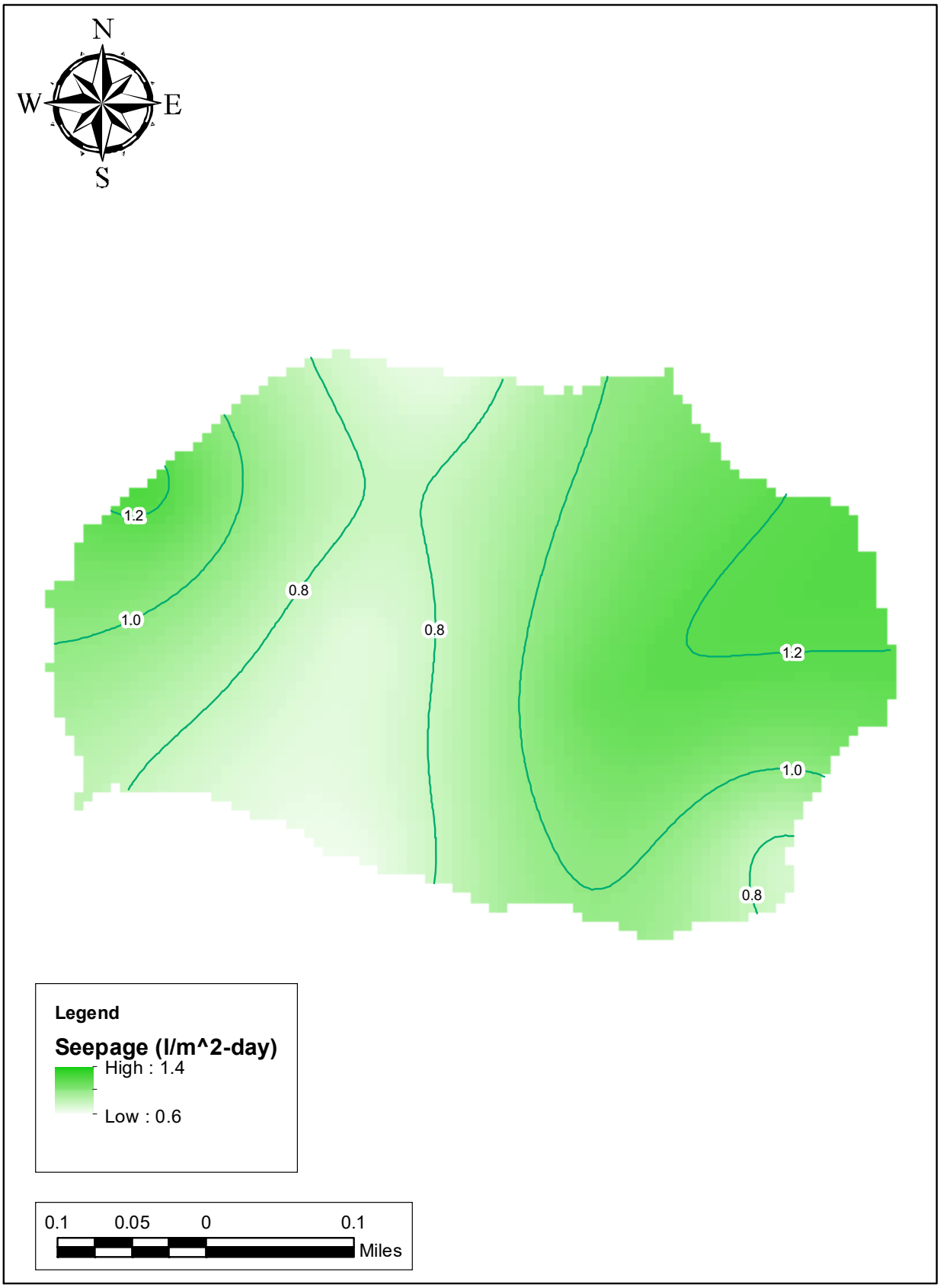


Figure 4-12. Isopleths of Mean Seepage Inflow to Trout Lake from June 2015-October 2016.

TABLE 4-10

SUMMARY OF HYDROLOGIC INPUTS TO TROUT LAKE FROM GROUNDWATER SEEPAGE

SITE	NUMBER OF SAMPLES	SEEPAGE (liters/m^2-day)		
		Minimum	Maximum	Mean
1	10	0.35	1.71	0.69
2	10	0.39	2.11	0.78
3	10	0.33	0.99	0.64
4	9	0.28	3.87	1.25
5	10	0.11	2.13	0.71
6	9	0.23	2.36	1.15
Total:	**58**			

The most elevated seepage inflow rates were observed along the eastern and western portions of Trout Lake, with the lowest seepage influx observed in central and southeastern portions of the lake. The areas of more elevated seepage influx along the east side of Trout Lake likely reflect influx of water through the relatively permeable wetland hydric soils associated with the Trout Lake wetland.

The seepage isopleths indicated on Figure 4-12 were graphically integrated to obtain estimates of mean daily seepage influx into Trout Lake. A summary of the results of this analysis is given in Table 4-11. The mean seepage influx to Trout Lake during the field monitoring program was 0.95 liters/m^2-day, which is equivalent to approximately 0.33 ac-ft/day or 121 ac-ft/yr.

TABLE 4-11

ESTIMATED MEAN SEEPAGE INFLOW TO TROUT LAKE FROM JUNE 2015 – OCTOBER 2016

PARAMETER	UNITS	VALUE
Lake Area	acres	106
Mean Seepage Inflow	liters/m^2-day ac-ft/year	0.95 121
Seepage/Surface Area Ratio	ft/yr	1.14

The calculated seepage/surface area ratio is provided in the final row of Table 4-11. This value provides an estimate of seepage inflow in terms of a water depth over the entire lake surface and provides a method for comparing relative seepage inflow between lakes without consideration of lake area. During the field monitoring program, seepage inflow into Trout Lake contributed a water volume equivalent to 1.14 ft over the entire surface area of the lake. This value is slightly lower than the mean seepage loading rates measured by ERD in other Central Florida lakes, but similar to the value of 1.01 ft/yr measured in Lake Yale. The seepage inflow listed on Table 4-11 is used in subsequent sections for development of an overall hydrologic budget for the lake.

4.2 Hydrologic Losses

Hydrologic losses from Lake Yale and Trout Lake occur as a result of evaporation from the lake surface, discharge through the outfall structures, irrigation withdrawals, and discharges from deeper portions of each lake bottom to underground aquifers. Estimated losses from each of these sources are discussed in the following sections.

4.2.1 Evaporation Losses

Estimates of monthly evaporation from Lake Yale and Trout Lake were generated based upon mean monthly evaporation data collected at the Lake Alfred Experimental Station over the 30-year period from 1965-1994. The Lake Alfred Station is located approximately 30 miles southwest of Orlando and appears to be the closest long-term evaporation monitoring site to the Central Florida area. A summary of mean monthly evaporation for this site is given in Table 4-12. For purposes of this project, the mean evaporation measured at the Lake Alfred site is assumed to be similar to evaporation at Lake Yale and Trout Lake. The recorded data at the Lake Alfred site reflects pan evaporation, with lake evaporation assumed to be equal to 70% of the pan evaporation values.

TABLE 4-12

MEAN MONTHLY LAKE EVAPORATION AT THE LAKE ALFRED EXPERIMENTAL STATION SITE

MONTH	MEAN PAN EVAPORATION (inches)	LAKE EVAPORATION[1] (inches)	MONTH	MEAN PAN EVAPORATION (inches)	LAKE EVAPORATION[1] (inches)
January	3.47	2.43	July	7.57	5.30
February	4.21	2.95	August	7.16	5.01
March	6.26	4.38	September	6.28	4.40
April	7.60	5.32	October	5.51	3.86
May	8.47	5.93	November	3.98	2.79
June	7.65	5.36	December	3.22	2.25
			TOTAL:	**71.38**	**49.98**

1. Assumed to be 70% of pan evaporation

4.2.1.1 Lake Yale

A summary of estimated monthly evaporation losses from Lake Yale is given in Table 4-13. The values summarized in this table were obtained by multiplying the lake surface area (4,012 acres) times the estimated monthly lake evaporation values. Mean annual volumetric losses from lake evaporation remove approximately 16,712 ac-ft/yr from Lake Yale.

TABLE 4-13

SUMMARY OF MONTHLY HYDROLOGIC LOSSES FROM LAKE YALE AS A RESULT OF SURFACE EVAPORATION

MONTH	EVAPORATION		MONTH	EVAPORATION	
	inches/month	ac-ft		inches/month	ac-ft
January	2.43	813	July	5.30	1,772
February	2.95	986	August	5.01	1,675
March	4.38	1,465	September	4.40	1,471
April	5.32	1,779	October	3.86	1,291
May	5.93	1,983	November	2.79	933
June	5.36	1,792	December	2.25	752
			TOTAL:	**49.98**	**16,712**

4.2.1.2 Trout Lake

A summary of estimated monthly evaporation losses from Trout Lake is given in Table 4-14. The values summarized in this table were obtained by multiplying the lake surface area (106 acres) times the estimated monthly lake evaporation values. Mean annual volumetric losses from lake evaporation remove approximately 443 ac-ft/yr from Trout Lake.

TABLE 4-14

SUMMARY OF MONTHLY HYDROLOGIC LOSSES FROM TROUT LAKE AS A RESULT OF SURFACE EVAPORATION

MONTH	EVAPORATION		MONTH	EVAPORATION	
	inches/month	ac-ft		inches/month	ac-ft
January	2.43	21.5	July	5.30	46.9
February	2.95	26.1	August	5.01	44.4
March	4.38	38.8	September	4.40	39.0
April	5.32	47.1	October	3.86	34.2
May	5.93	52.5	November	2.79	24.7
June	5.36	47.5	December	2.25	19.9
			TOTAL:	**49.98**	**443**

4.2.2 Deep Aquifer Recharge

In addition to losses through the outfall systems for Lake Yale and Trout Lake, a portion of the annual hydrologic inputs to Lake Yale and Trout Lake is lost as a result of downward migration of water in deeper areas of the lakes into intermediate aquifer layers. This phenomenon occurs simultaneously with groundwater seepage which is a result of groundwater movement into the lake above the initial confining layer, while deep recharge occurs as a result of permeable connections in deeper portions of the lake to underlying aquifers.

Information on aquifer recharge rates for Lake Yale and Trout Lake was obtained from the SJRWMD GIS recharge map for the Middle St. Johns River Basin. A summary of the recharge map for areas in the vicinity of Lake Yale and Trout Lake is given on Figure 4-13. According to the SJRWMD GIS recharge map, deep recharge to the Floridan Aquifer in the vicinity of both Lake Yale and Trout Lake is estimated to be approximately 0-4 inches/year. This implies that a volume equivalent to 0-4 inches over each lake surface would be lost as a result of recharge into deeper aquifers. Aquifer recharge rates increase substantially in upstream portions of each drainage basin, with values in excess of 12 inches/year in some areas.

In the absence of site-specific data, ERD generally relies on information contained in the SJRWMD GIS recharge maps for purposes of developing hydrologic budgets for lakes. However, the document titled “Lake Apopka and the Upper Ocklawaha River Minimum Flows and Levels-Hydrologic Assessment Method Report” by Huang and Smith (2015) provides a calibrated hydrologic budget for Lake Yale which includes estimates of recharge to the Upper Floridan Aquifer through the lake bottom. Over the period from 1985-2006, recharge to the Upper Floridan Aquifer removed approximately 1,994-4,307 ac-ft/yr from Lake Yale, with an overall mean loss of 2,887 ac-ft/yr, equivalent to approximately 8.6 inches/year over the lake surface. Since site-specific estimates are available, ERD used the estimated annual mean of 2,887 ac-ft/yr as the estimate of recharge losses from Lake Yale. However, Trout Lake was not included in the hydrologic budgets prepared by Huang and Smith, so the interval midpoint value of 2 inches/year obtained from the SJRWMD GIS map (midpoint of 0-4 inches/year) is used.

Estimates of annual aquifer recharge for Lake Yale and Trout Lake were generated using an average recharge rate of 2 inches/year for Trout Lake (representing the mid-point of the range of values) and the calibrated value of 8.64 inches/year for Lake Yale. A summary of estimated annual volumetric losses from deep recharge in each lake is given in Table 4-15. On an average annual basis, deep recharge removes approximately 2,887 ac-ft/yr from Lake Yale and 17.7 ac-ft/yr from Trout Lake.

TABLE 4-15

ESTIMATED ANNUAL DEEP RECHARGE LOSSES FROM LAKE YALE AND TROUT LAKE

LAKE	AREA (acres)	ESTIMATED DEEP RECHARGE LOSS	
		inches/year	ac-ft/yr
Lake Yale	4,012	8.64	2,887
Trout Lake	106	2	17.7

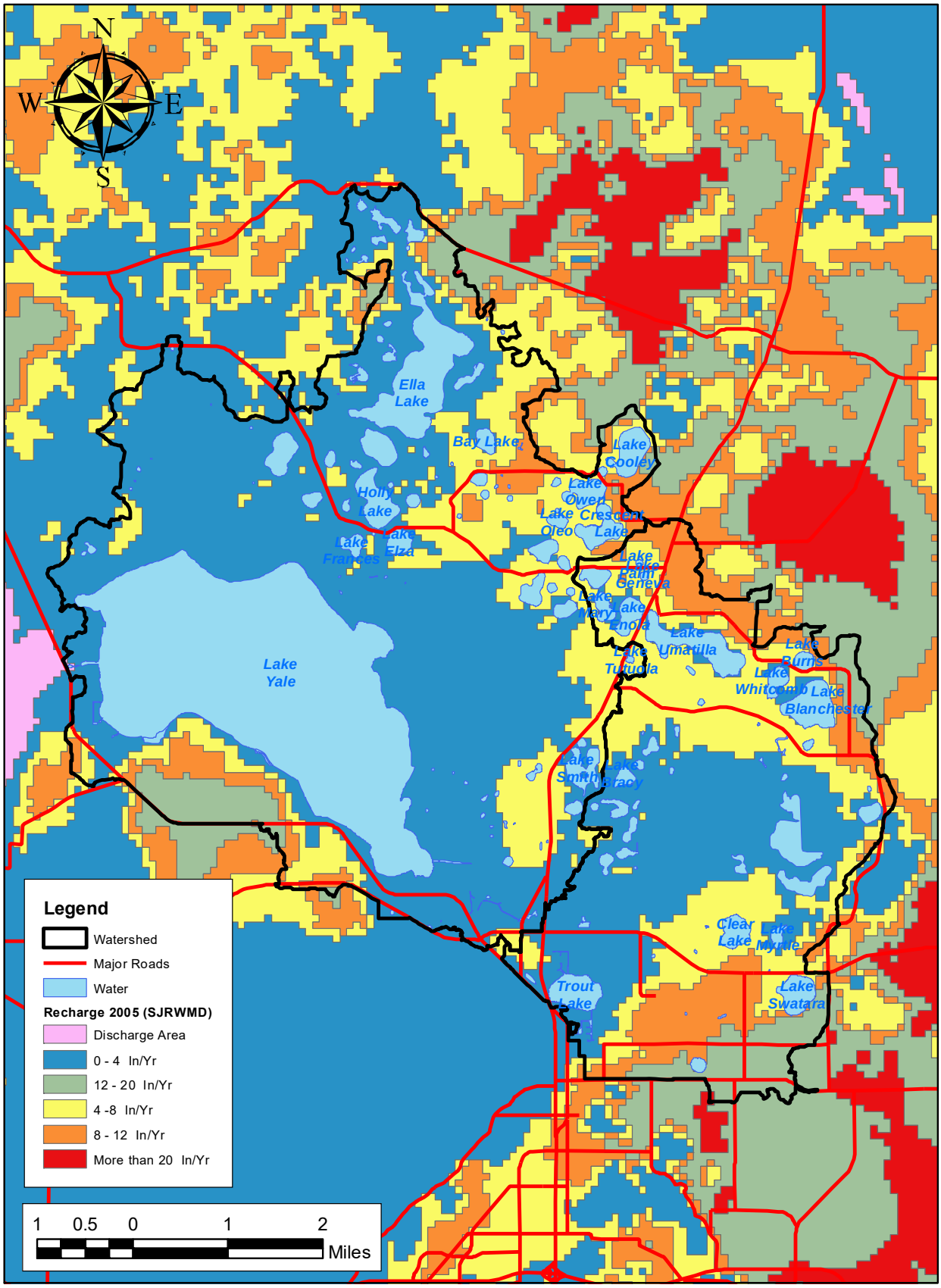


Figure 4-13. Aquifer Recharge Rates in the Vicinity of Lake Yale and Trout Lake.

4.2.3 Withdrawals

The 2015 draft document titled “Lake Apopka and the Upper Ocklawaha River Minimum Flows and Levels-Hydrologic Assessment Report” by Huang and Smith also includes information on irrigation withdrawals from Lake Yale for agricultural areas adjacent to the lake. Over the period from 1995-2006, Huang and Smith estimate an average annual surface withdrawal of 116 ac-ft. This value is used in a subsequent section to develop an overall hydrologic budget for Lake Yale.

4.2.4 Outfall Discharges

Discharges from Lake Yale and Trout Lake are regulated by the respective outfall structures discussed in Section 2.5. The outfall structure from Trout Lake to Lake Eustis is a free-flowing connection which maintains water exchange between the two lakes as long as water levels exceed the invert elevation of the 8-ft x 12-ft CBC which passes beneath US 19. Based upon visual observations during this project, and the water elevation data for Lake Eustis provided on Figure 2-76, it appears that a free-flowing connection is maintained a majority of the time.

Under current conditions, discharges from Lake Yale are regulated by the invert of the 24-inch HDPE pipe located in the earth berm on the east side of CR 452. Based on newspaper accounts, it appears that the invert elevation of this pipe is approximately 58.0 ft. Up until approximately 1999, water elevations in Lake Yale routinely exceeded this elevation and discharges from the lake occurred on a routine basis. However, since approximately 2000, water level elevations in Lake Yale have been more variable, with little or no discharge occurring from Lake Yale over the past 10 years.

For purposes of this analysis, mean annual discharges from Trout Lake and Lake Yale are calculated as the difference between quantified inputs and outputs for each lake on an annual basis according to the following relationship:

Outfall Discharge = (Precipitation + Runoff Inputs + Seepage)

- (Evaporation + Recharge + Irrigation Withdrawal)

This information is calculated as part of the hydrologic budget summarized in Section 4.3 and reflects discharges from each of the two lakes over a long-term annual average basis, and does not necessarily reflect or predict lake discharges during any particular year.

4.3 Hydrologic Budget

4.3.1 Lake Yale

A summary of identified hydrologic inputs to Lake Yale on an average annual basis is given in Table 4-16. Estimates of hydrologic inputs are provided for direct precipitation, stormwater runoff, direct overland flow, and groundwater seepage. A graphical comparison of hydrologic inputs to Lake Yale is given on Figure 4-14.

TABLE 4-16

CALCULATED HYDROLOGIC INPUTS TO LAKE YALE

SOURCE	ANNUAL INFLOW (ac-ft/yr)	PERCENT OF TOTAL (%)
Precipitation	16,608	75
Runoff	1,437	7
Direct Overland Flow	17	< 1
Groundwater Seepage	4,044	18
TOTAL:	**22,106**	**100**

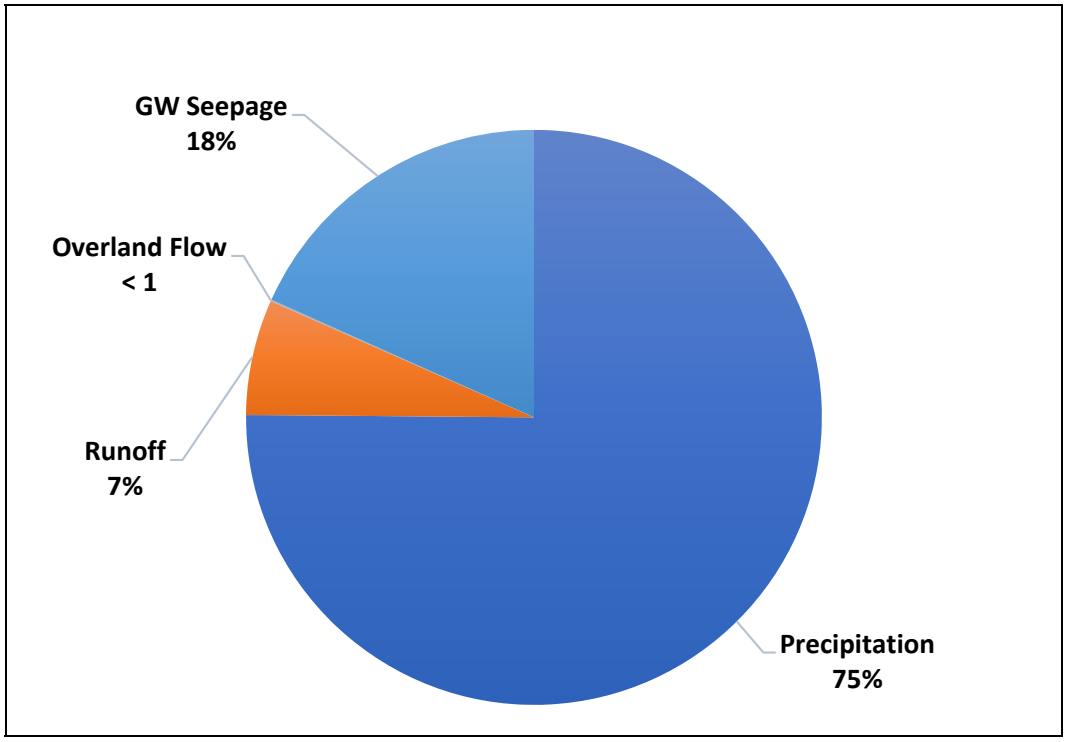


Figure 4-14. Summary of Mean Annual Hydrologic Inputs to Lake Yale.

The largest annual hydrologic input to Lake Yale is precipitation which contributes 75% of the total annual hydrologic inputs to the lake. Approximately 7% of the average annual hydrologic inputs originate as a result of stormwater runoff. Groundwater seepage contributes approximately 18% of the annual hydrologic inputs, with <1% contributed by direct overland flow. On an average annual basis, approximately 22,106 ac-ft of water is discharged to Lake Yale each year.

A summary of mean annual hydrologic losses from Lake Yale is given in Table 4-17. Approximately 76% of the annual hydrologic inputs are lost to evaporation, with 13% lost as deep recharge to underground aquifers, and <1% removed by irrigation withdrawals. On an annual average basis, approximately 11% of the annual inputs discharge from the lake through the outfall, equivalent to 0.7 inches over the lake surface. A graphical comparison of mean annual hydrologic losses for Lake Yale is given on Figure 4-15.

TABLE 4-17

CALCULATED HYDROLOGIC LOSSES FROM LAKE YALE

SOURCE	ANNUAL LOSSES (ac-ft/yr)	PERCENT OF TOTAL (%)
Evaporation	16,712	76
Deep Recharge	2,887	13
Irrigation Withdrawal	116	< 1
Outflow	2,391	11
TOTAL:	**22,106**	**100**

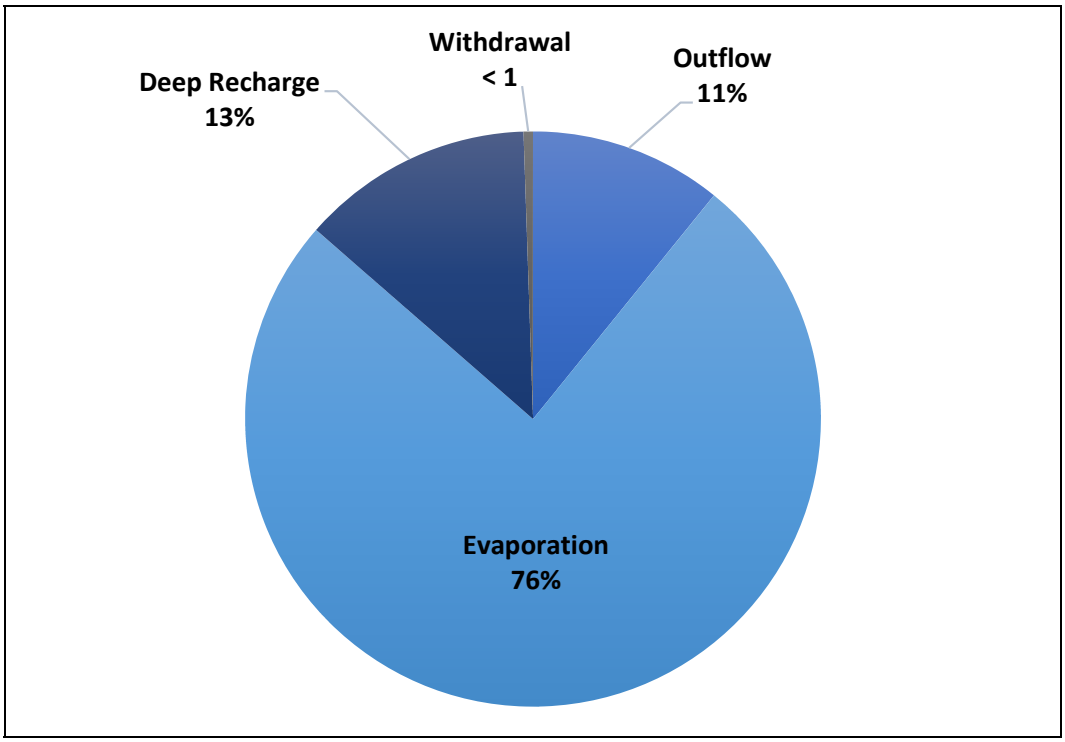


Figure 4-15. Summary of Mean Annual Hydrologic Losses from Lake Yale.

4.3.2 Trout Lake

A summary of identified hydrologic inputs to Trout Lake on an average annual basis is given in Table 4-18. Estimates of hydrologic inputs are provided for direct precipitation, stormwater runoff, direct overland flow, and groundwater seepage. A graphical comparison of hydrologic inputs to Trout Lake is given on Figure 4-16.

TABLE 4-18

CALCULATED HYDROLOGIC INPUTS TO TROUT LAKE

SOURCE	ANNUAL INFLOW (ac-ft/yr)	PERCENT OF TOTAL (%)
Precipitation	440	25
Runoff	1,201	68
Direct Overland Flow	0.1	< 1
Groundwater Seepage	121	7
TOTAL:	**1,762**	**100**

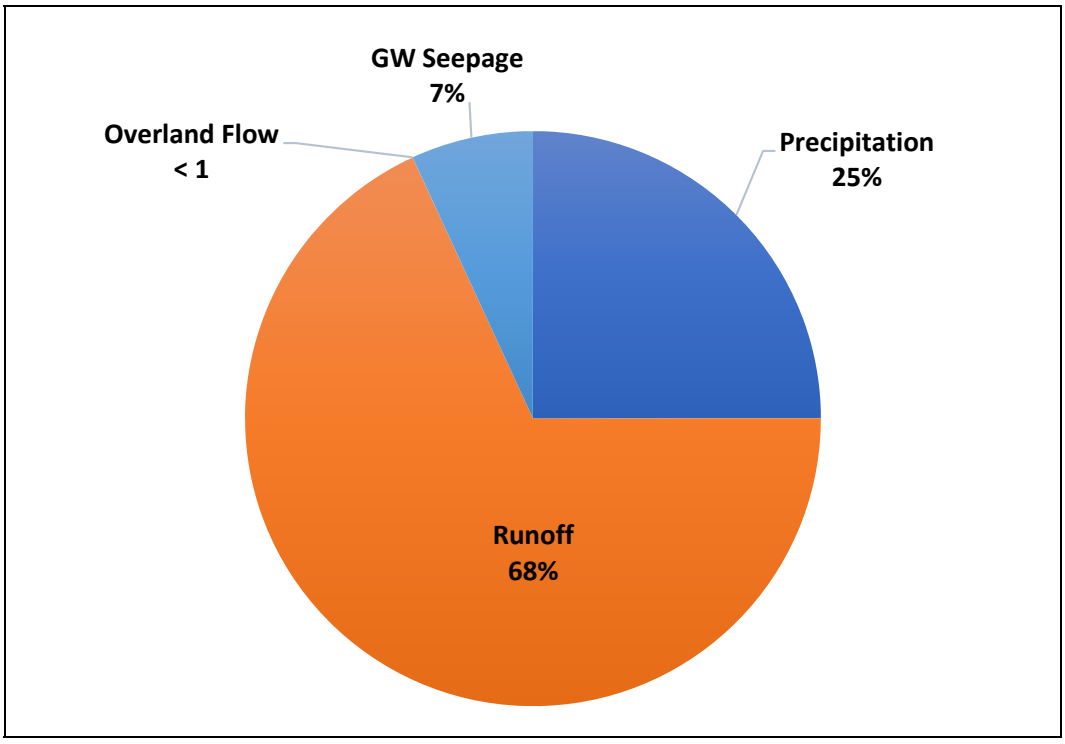


Figure 4-16. Summary of Mean Annual Hydrologic Inputs to Trout Lake.

The largest annual hydrologic input to Trout Lake is runoff which contributes 68% of the total annual hydrologic inputs to the lake. Approximately 25% of the average annual hydrologic inputs originate as a result of direct precipitation. Groundwater seepage contributes approximately 7% of the annual hydrologic inputs, with <1% contributed by direct overland flow. On an average annual basis, approximately 1,762 ac-ft of water is discharged to Trout Lake each year.

A summary of mean annual hydrologic losses from Trout Lake is given in Table 4-19. Approximately 74% of the annual hydrologic inputs are discharged to Lake Eustis, with 25% of the average annual hydrologic inputs lost to evaporation, and 1% lost as deep recharge to underground aquifers. A graphical comparison of mean annual hydrologic losses for Trout Lake is given on Figure 4-17.

TABLE 4-19

CALCULATED HYDROLOGIC LOSSES FROM TROUT LAKE

SOURCE	ANNUAL LOSSES (ac-ft/yr)	PERCENT OF TOTAL (%)
Evaporation	442	25
Deep Recharge	18	1
Outflow to Lake Eustis	1,302	74
TOTAL:	**1,762**	**100**

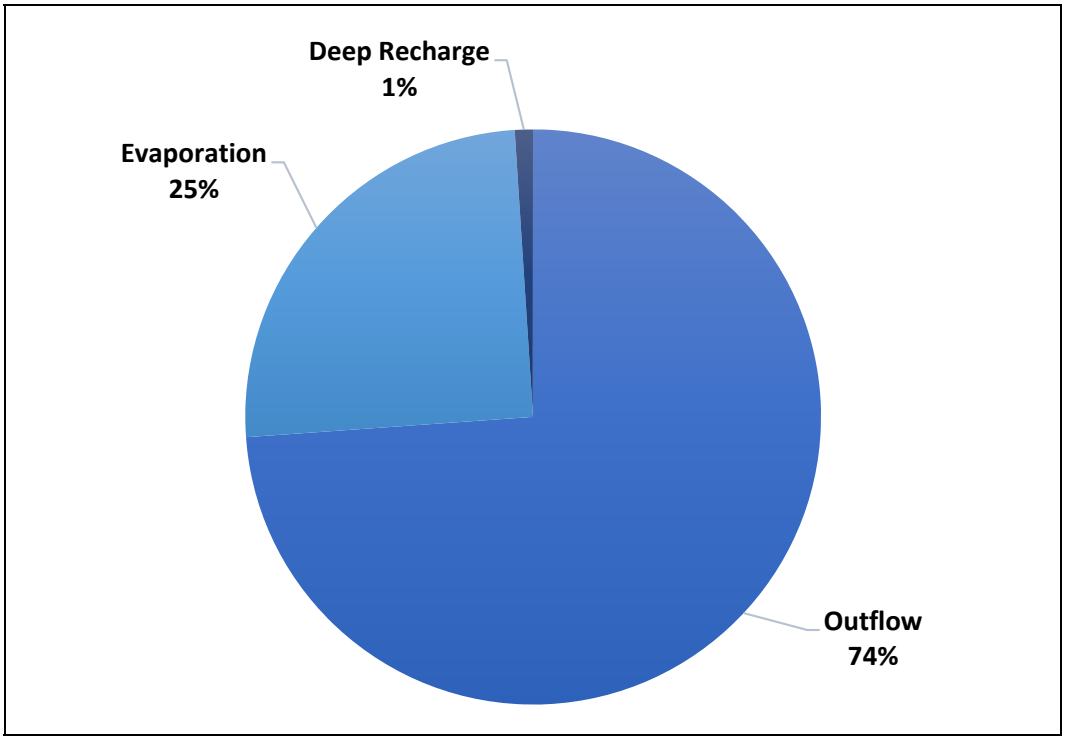


Figure 4-17. Summary of Mean Annual Hydrologic Losses from Trout Lake.

4.4 Water Residence Time

Mean annual water residence times were calculated for Lake Yale and Trout Lake by dividing the estimated water volume for each lake (summarized in Table 2-2 for Trout Lake and Table 2-5 for Lake Yale) by the calculated mean annual hydrologic inputs (summarized in Tables 4-16 and 4-18). A summary of this information is given in Table 4-20. Based upon this analysis, the calculated residence time in Lake Yale is approximately 710 days, with a residence time of 167 days for Trout Lake. The observed residence time in Lake Yale is longer than residence times commonly observed in urban lakes, while the residence time for Trout Lake is typical of residence times observed in urban lakes.

TABLE 4-20

CALCULATED MEAN ANNUAL RESIDENCE TIMES IN LAKE YALE AND TROUT LAKE

LAKE	LAKE VOLUME (ac-ft)	ANNUAL INFLOW (ac-ft/yr)	MEAN RESIDENCE TIME (days)
Yale	43,094	22,107	710
Trout	806	1,762	167

SECTION 5

NUTRIENT INPUTS AND LOSSES

Lake Yale and Trout Lake receive nutrient inputs from a variety of sources which include bulk precipitation, stormwater runoff, shallow groundwater seepage, and internal recycling. A discussion of these inputs, along with calculated mass loadings for each lake, is given in the following sections. Loading estimates from these sources are used to generate annual average nutrient budgets for total nitrogen, total phosphorus and TSS in each of the lakes. A conceptual schematic of evaluated nutrient sources and sinks in Lake Yale and Trout Lake is given in Figure 5-1.

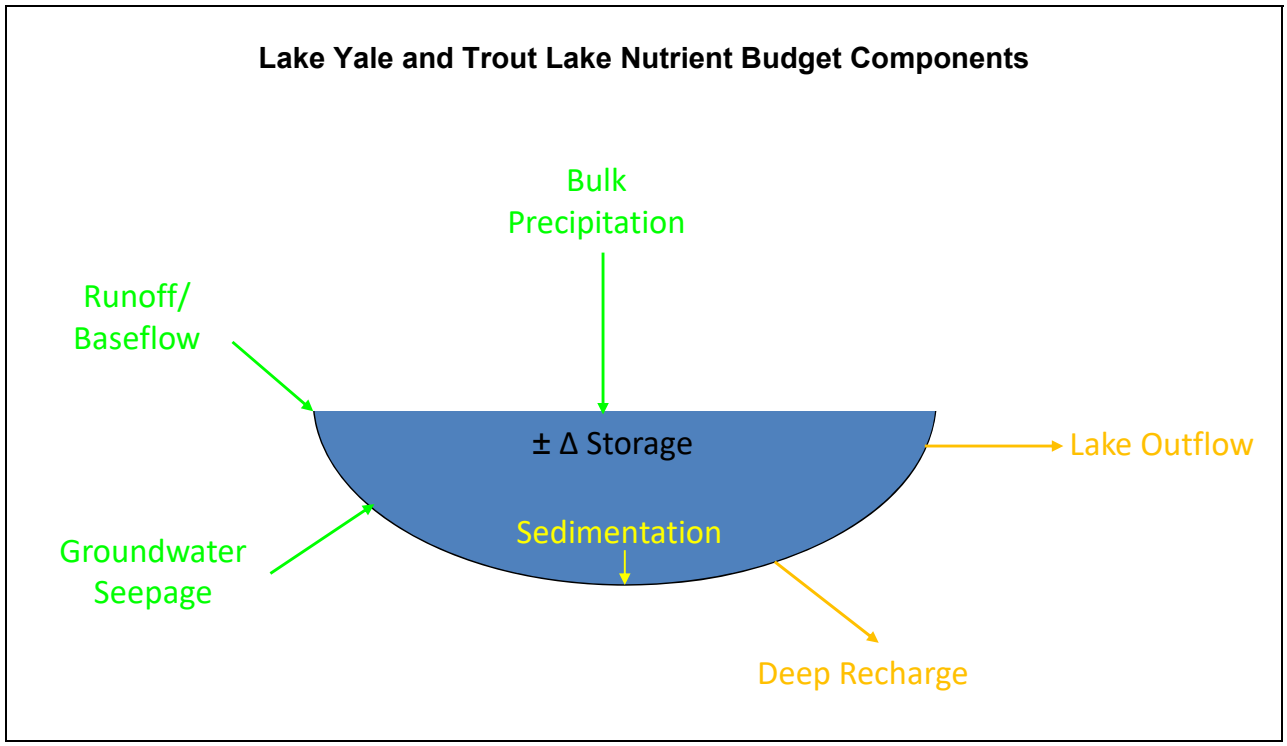


Figure 5-1. Conceptual Schematic of Evaluated Nutrient Inputs and Losses for Lake Yale and Trout Lake.

5.1 Characteristics of Nutrient Inputs

5.1.1 Bulk Precipitation

5.1.1.1 Chemical Characteristics

ERD has performed several evaluations of the characteristics of bulk precipitation in the Central Florida area. The most extensive of these evaluations was conducted as part of the Butler Chain-of-Lakes study. Bulk precipitation samples were collected by ERD on a continuous basis for a period of 12 months from December 2004-November 2005 at a semi-rural monitoring site located adjacent to the Keene's Point boat ramp on Lake Isleworth in southwest Orange County. Twenty-nine bulk precipitation samples were collected at the monitoring site and analyzed for general parameters, nutrients, and TSS. A summary of the mean characteristics of measured concentrations for nitrogen, phosphorus, and TSS in bulk precipitation at the Butler Chain-of-Lakes monitoring site is given in Table 5-1. For purposes of this evaluation, it is assumed that the bulk precipitation characteristics summarized in Table 5-1 are similar to bulk precipitation which falls on Lake Yale and Trout Lake.

TABLE 5-1

MEAN CHARACTERISTICS OF BULK PRECIPITATION IN THE CENTRAL FLORIDA AREA

PARAMETER	UNITS	CONCENTRATION
Nitrogen	µg/l	770
Phosphorus	µg/l	61
TSS	mg/l	17.3

5.1.1.2 Mass Loadings

5.1.1.2.1 Lake Yale

Estimates of annual mass loadings to Lake Yale from bulk precipitation were calculated for total nitrogen, total phosphorus, and TSS based upon the assumed characteristics listed in Table 5-1 and the estimated annual average volumetric input from direct precipitation of 16,607 ac-ft/yr (Table 4-2). A summary of calculated mean annual loadings to Lake Yale from bulk precipitation is given in Table 5-2.

TABLE 5-2

ESTIMATED MEAN ANNUAL LOADINGS TO LAKE YALE FROM BULK PRECIPITATION

PARAMETER	UNITS	MASS LOADINGS (kg/yr)
Total N	kg/yr	15,770
Total P	kg/yr	1,249
TSS	kg/yr	354,318

5.1.1.2.2 Trout Lake

Estimates of annual mass loadings to Trout Lake from bulk precipitation were calculated for total nitrogen, total phosphorus, and TSS based upon the assumed characteristics for bulk precipitation of 439 ac-ft/yr listed in Table 5-1 and the estimated annual average volumetric input from direct precipitation (Table 4-3). A summary of calculated mean annual loadings to Trout Lake from bulk precipitation is given in Table 5-3.

TABLE 5-3

ESTIMATED MEAN ANNUAL LOADINGS TO TROUT LAKE FROM BULK PRECIPITATION

PARAMETER	UNITS	MASS LOADINGS (kg/yr)
Total N	kg/yr	417
Total P	kg/yr	33.0
TSS	kg/yr	9,366

5.1.2 Stormwater Runoff

5.1.2.1 Field Monitoring Program

A field monitoring program was conducted by ERD from March 2015-June 2016 to generate site-specific runoff characterization data for significant inflows into Lake Yale and Trout Lake to increase the accuracy of the runoff loading calculations rather than relying on standard literature-based values. Runoff field monitoring was conducted at multiple locations for each lake. Each of the monitoring sites was located upstream from the point of inflow into each lake to reflect the characteristics of runoff which reaches each lake. Drainage in many of the sub-basin areas is collected and conveyed by shallow ditches and swales, with the runoff ultimately discharging into the lakes through shallow vegetated conveyance channels, shallow diffuse flow, or underground stormsewers. A brief description of each of the monitoring sites is given in the following sections.

5.1.2.1.1 Lake Yale

An overview of monitoring sites in the Lake Yale drainage basin is given on Figure 5-2. Five potential inflow sites were identified by ERD in the Lake Yale drainage basin, with an additional site at the Lake Yale outfall culvert. Four of the monitoring sites are located in the southeast corner of Lake Yale and reflect significant tributary or canal inputs to the lake. Another site is located on the south side of Lake Yale which discharges to the lake by a culvert beneath SR 452. The final monitoring site is located in the Lake Yale outfall canal at the 24-inch HDPE which currently controls water level elevations within the lake at an elevation of approximately 58.0 ft.

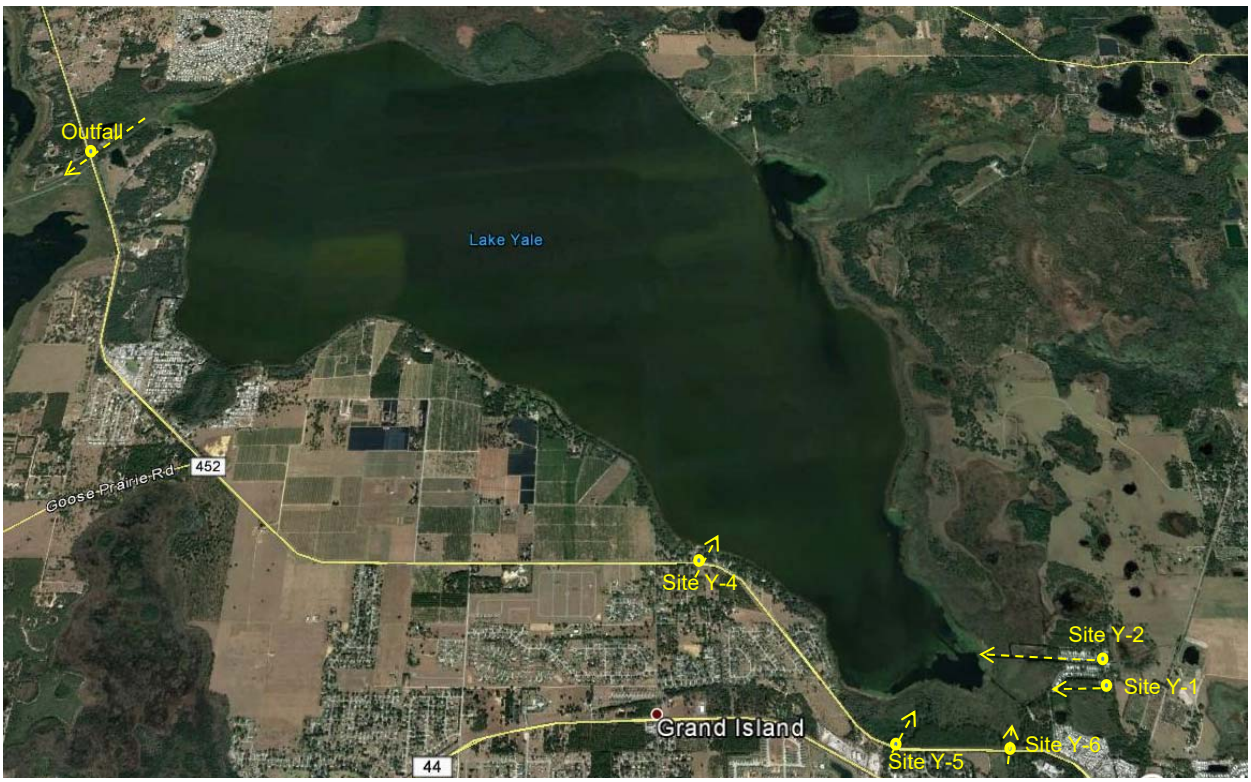


Figure 5-2. Monitoring Sites in the Lake Yale Drainage Basin.

ERD originally intended to also conduct inflow monitoring in shallow drainage canals associated with the agricultural and wetland areas located on the east and north sides of the lake. However, much of the runoff generated in these areas travels as diffuse flow through large wetland areas, making it impractical to collect samples and measure discharge rates. Attempts were also made to establish monitoring sites at road crossings for significant agricultural channels on the east side of Lake Yale, but permission could not be obtained from the land owner for access onto private property. In addition, these agricultural inputs discharge into large wetland areas prior to entering Lake Yale, and migration through the wetland areas would change the characteristics of the samples collected at the proposed agricultural sites.

Attempts were also made by ERD to collect runoff samples from the large agricultural area located on the central-southern side of Lake Yale which includes multiple sub-basin areas. Much of this area is currently in citrus or row crops and has a potential to create a significant loading to Lake Yale. However, the soils in this area are primarily in HSG A, and virtually all of the rainfall infiltrates into the soil with no significant runoff generated except during extreme design storm events. A similar situation was also present in areas located on the northwest side of Lake Yale, where most of the soils are in HSG A with little runoff potential. Therefore, no inflow samples were collected from this area during the field monitoring program.

Manual field monitoring was conducted at each of the 6 monitoring sites indicated on Figure 5-2 on a biweekly basis or following significant storm events which produced measurable runoff from the watershed. ERD field personnel would visit each of the 6 sites and collect a series of flow-weighted composite samples during events where measurable discharge was observed. The flow-weighted samples would then be combined together by site to form a composite sample for each site during each monitored event.

However, during the field monitoring program, samples were only collected at 3 of the 6 monitoring sites. Runoff inflow samples were collected at the sites designated as 1, 2, and 6, with no observed flow into Lake Yale during the field monitoring program from the inflow sites identified as 4 or 5, and no discharges were observed at the outfall monitoring site. A discussion of monitoring sites where samples were collected is given in the following sections.

5.1.2.1.1.1 Inflow Site 1

An overview of Lake Yale monitoring Site 1 is given on Figure 5-3. Site 1 is located on the southeast side of Lake Yale on Coyote Pass. Storm event monitoring was conducted at the box culvert which passes beneath Coyote Pass and ultimately discharges to Lake Yale. In addition to the residential runoff from areas adjacent to the channel, this site also receives runoff from upstream agricultural areas consisting of both pasture and citrus land use. This channel forms the discharge from Lake Yale sub-basin LYD 13-01 which is described in Section 3. This inflow has characteristics similar to much of the existing land use located on the east side of Lake Yale.



Canal from upstream areas



Road crossing at Coyote Pass



Canal downstream from Coyote Pass

Figure 5-3.

Lake Yale Inflow Monitoring Site 1.

Inflow samples collected at this site were taken from the upstream side of Coyote Pass at the box culvert site indicated on Figure 5-3. After passing beneath Coyote Pass, the canal ultimately discharges into the southeast corner of Lake Yale.

5.1.2.1.1.2 Inflow Site 2

An overview of Lake Yale monitoring Site 2 is given on Figure 5-4. As indicated on Figure 5-2, Site 2 is located in the next significant tributary inflow north of Site 1 and primarily reflects inputs from agricultural areas located east of the monitoring site along with a small amount of residential runoff from homes in the vicinity of the monitoring site. This inflow constitutes the discharge from sub-basin LYD 12-01 which is described in Section 3. Monitoring at this site was also conducted at the crossing of the canal and Coyote Pass, with samples collected from the east side of the roadway.



Canal from upstream areas with local drainage inlet



Canal on west side of Coyote Pass

Figure 5-4. Lake Yale Inflow Monitoring Site 2.

5.1.2.1.1.3 Inflow Site 6

An overview of Lake Yale monitoring Site 6 is given on Figure 5-5. As indicated on Figure 5-2, Site 6 is located on CR 452 approximately 800 ft west of Yale Retreat Road and is associated with the Lake Yale sub-basin identified as LYD 14-01 which primarily receives runoff generated within the Eustis Commerce Park. The two most significant tenants in the commerce park are US Nutraceutical and Florida Food Products, each of which has large facilities covering multiple acres.



Figure 5-5. Lake Yale Inflow Monitoring Site 6.

5.1.2.1.2 Trout Lake

An overview of inflow and outflow monitoring sites in the Trout Lake drainage basin is given on Figure 5-6. Seven potential monitoring sites were identified by ERD as potential inflows or outflows.



Figure 5-6. Inflow Monitoring Sites in the Trout Lake Drainage Basin.

Field monitoring was conducted at the inflow/outflow monitoring sites for Trout Lake over the period from March 2015-June 2016. During this time, inflow/outflow samples were collected at 5 of the 7 inflow/outflow monitoring sites, with samples collected at Hicks Ditch, Nature Center, Site 1, Site 3, and the lake outflow. No measurable inflow was observed at the monitoring sites identified as Site 2 and Site 4 on Figure 5-6. A brief description for inflow sites where samples were collected is given in the following sections.

5.1.2.1.2.1 Hicks Ditch Site

As discussed in Section 3, Hicks Ditch is a 7,579 acre drainage basin which generates approximately 64.3% of the annual runoff inflows to Trout Lake. Monitoring at Trout Lake was conducted at the culvert crossing for Hicks Ditch at CR 44. Photographs of the Hicks Ditch monitoring site are provided in Figure 5-7. Hicks Ditch passes beneath CR 44 through a concrete box culvert which discharges into the northeast portion of the wetland area surrounding the eastern half of Trout Lake. Field monitoring was conducted on the north side of CR 44 immediately upstream of the box culvert structure.



Hicks Ditch at CR 44 Crossing



Hicks Ditch on north side of CR 44



Hicks Ditch on south side of CR 44

Figure 5-7. Overview of Hicks Ditch Monitoring Site.

During each field monitoring event, field measurements of discharge were collected at the monitoring site, and a grab sample was collected for laboratory analyses. Hicks Ditch exhibited highly variable discharge during the field monitoring program, with measurable discharges occurring only following significant rain events or extended periods of rainfall.

5.1.2.1.2.2 Nature Center Site

An overview of the Nature Center monitoring site is given on Figure 5-8. This site is located at a culvert crossing for the entrance roadway for the Nature Center off CR 44 and is used to estimate the general characteristics of the wetland area located on the north and east sides of Trout Lake. Discharges through the roadway culverts only occurred during extreme wet season conditions, and only a small number of samples were collected at this site during the field monitoring program. The characteristics of water collected at this site are used to represent the general characteristics of the wetland areas discharging to Trout Lake.



Figure 5-8. Overview of the Nature Center Monitoring Site.

5.1.2.1.2.3 Monitoring Site 1

An overview of Trout Lake monitoring Site 1 is given on Figure 5-9. This site is located in the residential canal which provides drainage for the large mobile home park located on the northwest side of Trout Lake. The monitoring site was located in the canal channel approximately 100 ft upstream from the point of inflow into Trout Lake.

Measurable discharge at this site was observed only immediately following significant rain events. This site is used to reflect the runoff characteristics generated by the large mobile home park area contained within Trout Lake sub-basins 04 and 05.



Figure 5-9. Overview of Trout Lake Monitoring Site 1.

5.1.2.1.2.4 Monitoring Site 3

An overview of Trout Lake monitoring Site 3 is given on Figure 5-10. This monitoring site receives runoff primarily from the open spaces and industrial areas located in sub-basin 01-02 on the west side of SR 19 which passes beneath SR 19 through a large concrete box culvert. Field monitoring was conducted at the culvert discharge on the east side of SR 19 approximately 150 ft upstream from Trout Lake.

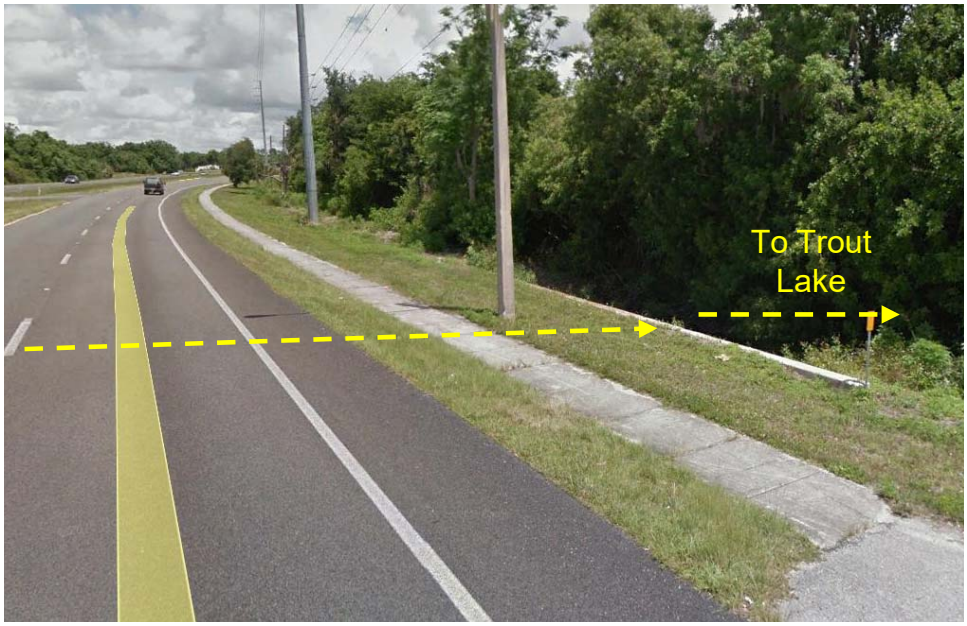


Figure 5-10. Overview of Trout Lake Monitoring Site 3.

5.1.2.1.2.5 Trout Lake Outflow

The final monitoring site associated with Trout Lake was at the 8-ft x 12-ft CBC discharge from the lake at SR 19. Photographs of the outfall structure for Trout Lake were provided previously in Figure 2-68. Field monitoring for this site was conducted on the west side of SR 19 due to the larger right-of-way on this side. Samples collected at this site reflect the characteristics of water leaving Trout Lake and the data are used in subsequent analyses to discuss internal recycling and water quality management options.

5.1.2.2 Characteristics of Monitored Inflow Samples

Field monitoring was conducted at each of the Lake Yale and Trout Lake monitoring sites over the period from March 2015-June 2016. Field samples were collected if flowing water was present during each field visit for monitoring surface water and groundwater seepage. The numerous ditches, canals, and tributaries in the Lake Yale and Trout Lake basins have large contributing areas with inflows provided by a combination of surface runoff and baseflow generated by groundwater, and once discharges begin to occur, flows continue for an extended period of time. In addition, samples were also collected during significant rain events which occurred while ERD field personnel were in the general vicinity of Lake Yale and Trout Lake. A discussion of the characteristics of inflow samples collected at Lake Yale and Trout Lake is given in the following sections.

5.1.2.2.1 Lake Yale

An overview of the number of samples collected at the Lake Yale monitoring sites during the field monitoring program is given on Figure 5-11. A total of 17 separate composite samples was collected at Site 1, with 8 composite samples collected at Site 2, and 1 sample collected at Site 6. No inflow samples were collected during the field monitoring program at Sites 4 or 5 or at the outfall structure for the lake. A complete listing of measured characteristics of inflow samples collected in the Lake Yale drainage basin is given in Appendix H.1. Overall, a total of 26 separate inflow samples was collected in the Lake Yale drainage basin during the field monitoring program.

A tabular summary of geometric mean characteristics of inflow samples collected at the Lake Yale monitoring sites during the field monitoring program is given on Table 5-4. In general, a high degree of variability is apparent in geometric mean characteristics of inflow samples collected at the 3 monitoring sites. Inflow samples collected at Lake Yale monitoring Site 1 (sub-basin LYD 13-01) were approximately neutral in pH and moderately well buffered, with a mean conductivity of approximately 214 μmho/cm, a value on the lower end of the range of measurements commonly observed in stormwater runoff. Samples collected at Site 1 exhibited extremely low levels of both ammonia and NO_x, with approximately 80% of the total nitrogen present as dissolved organic nitrogen. The overall geometric mean concentration for total nitrogen of 683 μg/l is low in value compared with nitrogen concentrations commonly observed in stormwater runoff. However, samples collected at Site 1 were characterized by elevated levels of soluble reactive phosphorus (SRP), with an overall geometric mean value of 194 μg/l. Measured concentrations for both dissolved organic phosphorus and particulate phosphorus were low in value, with an overall mean total phosphorus concentration of 291 μg/l. Runoff samples collected at this site were characterized by extremely low levels of both turbidity and TSS, with an elevated color value of 94 Pt-Co units.

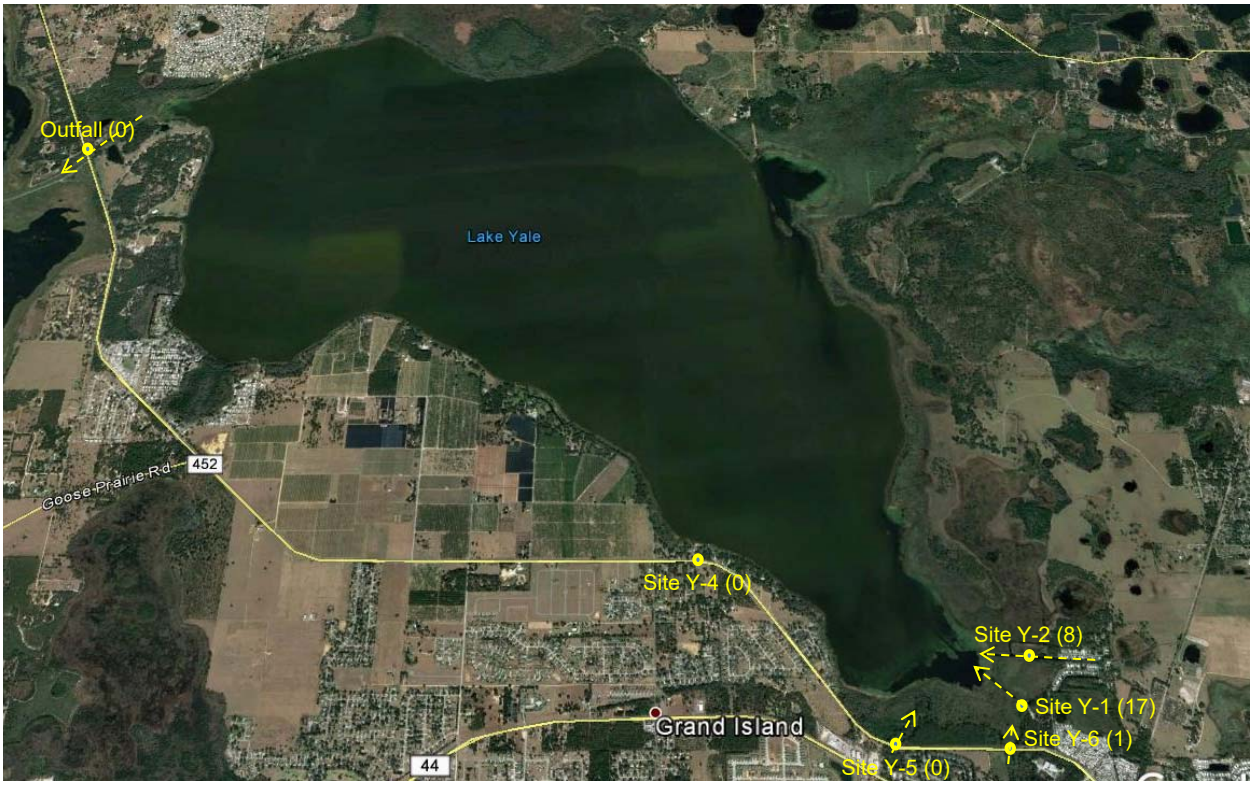


Figure 5-11. Number of Runoff Samples Collected at the Lake Yale Inflow Monitoring Sites.

TABLE 5-4

CHARACTERISTICS OF INFLOW SAMPLES AT THE LAKE YALE MONITORING SITES

PARAMETER	UNITS	SUB-BASIN / SITE		
		LYD 12-01 Inflow 2	LYD 13-01 Inflow 1	LYD 14-01 Inflow 6
Number of Samples	--	8	17	1
pH	s.u.	5.99	6.96	7.55
Alkalinity	mg/l	22.3	74.3	262
Conductivity	µmho/cm	156	214	1,253
Ammonia	µg/l	47	19	10
NO_x	µg/l	15	8	3
Dissolved Organic Nitrogen	µg/l	1,665	537	1,201
Particulate Nitrogen	µg/l	368	76	128
Total Nitrogen	µg/l	2,225	683	1,342
SRP	µg/l	56	194	1,780
Dissolved Organic Phosphorus	µg/l	34	23	1,562
Particulate Phosphorus	µg/l	50	49	4,963
Total Phosphorus	µg/l	166	291	8,305
Turbidity	NTU	6.2	2.5	4.9
Color	Pt-Co	404	94	266
TSS	mg/l	12.3	2.5	1.6

The measured characteristics of runoff samples collected at Site 2 were substantially different than samples collected at Site 1. Runoff samples collected at Site 2 were characterized by a slightly acidic geometric mean pH value of 5.99 and a mean alkalinity of 22.3 mg/l, reflecting poorly buffered conditions. Runoff samples at Site 2 were characterized by low concentrations of both ammonia and NO_x, with a somewhat elevated overall total nitrogen concentration of 2,225 μg/l. The dominant nitrogen species measured in runoff at this site is dissolved organic nitrogen which comprised approximately 75% of the measured total nitrogen. Runoff samples at this site were characterized by relatively low concentrations of SRP, dissolved organic phosphorus, and particulate phosphorus, with a moderate total phosphorus concentration of 166 μg/l. Measured concentrations of turbidity and TSS were moderate at this site, with a substantially elevated color value of 404 Pt-Co units.

Somewhat unusual runoff characteristics were observed in the runoff sample collected at Lake Yale inflow Site 6 (sub-basin LYD 14-01). The sample collected at this site was characterized by a slightly alkaline pH value of 7.55 and an unusually elevated alkalinity of 262 mg/l. The measured conductivity value in the runoff sample was also extremely elevated, with a measurement of 1,253 μmho/cm which is near the Class III freshwater limit of 1,275 μmho/cm, indicating that the sample almost qualifies as brackish. The runoff sample contained extremely low levels of both ammonia and NO_x, with a moderate total nitrogen concentration of 1,342 μg/l. The dominant nitrogen species at this site is dissolved organic nitrogen which comprises 90% of the measured total nitrogen.

However, the runoff sample collected at Site 6 contained extremely elevated values for SRP (1,780 μg/l), dissolved organic phosphorus (1,562 μg/l), particulate phosphorus (4,963 μg/l), and total phosphorus (8,305 μg/l), which were 1-2 orders of magnitude greater than samples collected at Sites 1 and 2. The observed concentrations for the measured phosphorus species are substantially greater than concentrations commonly observed in urban runoff and suggest a significant contributing phosphorus source within the watershed. The runoff collected from this site originated within the Eustis Commerce Park which includes major facilities operated by US Nutraceutical and Florida Food Products. The sample collected at this site contained extremely low levels of both turbidity and TSS, with an elevated color value of 266 Pt-Co units.

A statistical summary of measured values of pH, alkalinity, conductivity, and TSS in runoff samples collected from the Lake Yale drainage basin is given in Figure 5-12 in the form of Tukey box and whisker plots. The bottom of the box portion of each plot represents the lower quartile, with 25% of the data points falling below this value. The upper line of the box represents the 75% upper quartile, with 25% of the data falling above this value. The **blue horizontal line** within the box represents the median value, with 50% of the data falling both above and below this value. The vertical lines, also known as "whiskers", represent the 10 and 90 percentiles for the data sets. Individual values which fall outside of the 10-90 percentile range are indicated as **red dots**.

A moderate degree of variability was observed in measured values for pH which ranged from approximately 6.6-7.4 at inflow Site 1, 5.9-6.1 at inflow Site 2, and a value of 7.6 at inflow Site 6. A similar pattern was also observed for alkalinity, with a relatively low degree of variability observed in measured values collected at each individual site, although the value at Site 6 was 4-10 times greater than the other sites. A similar pattern was also observed for conductivity, with moderate to low conductivity values observed at inflow Sites 1 and 2, and a substantially elevated conductivity observed at inflow Site 6. A somewhat higher degree of variability was observed for measured concentrations of total suspended solids at the individual monitoring sites, with measured values ranging from approximately 1-8 mg/l at Site 1, 8-17 mg/l at Site 2, and approximately 2 mg/l at Site 6.

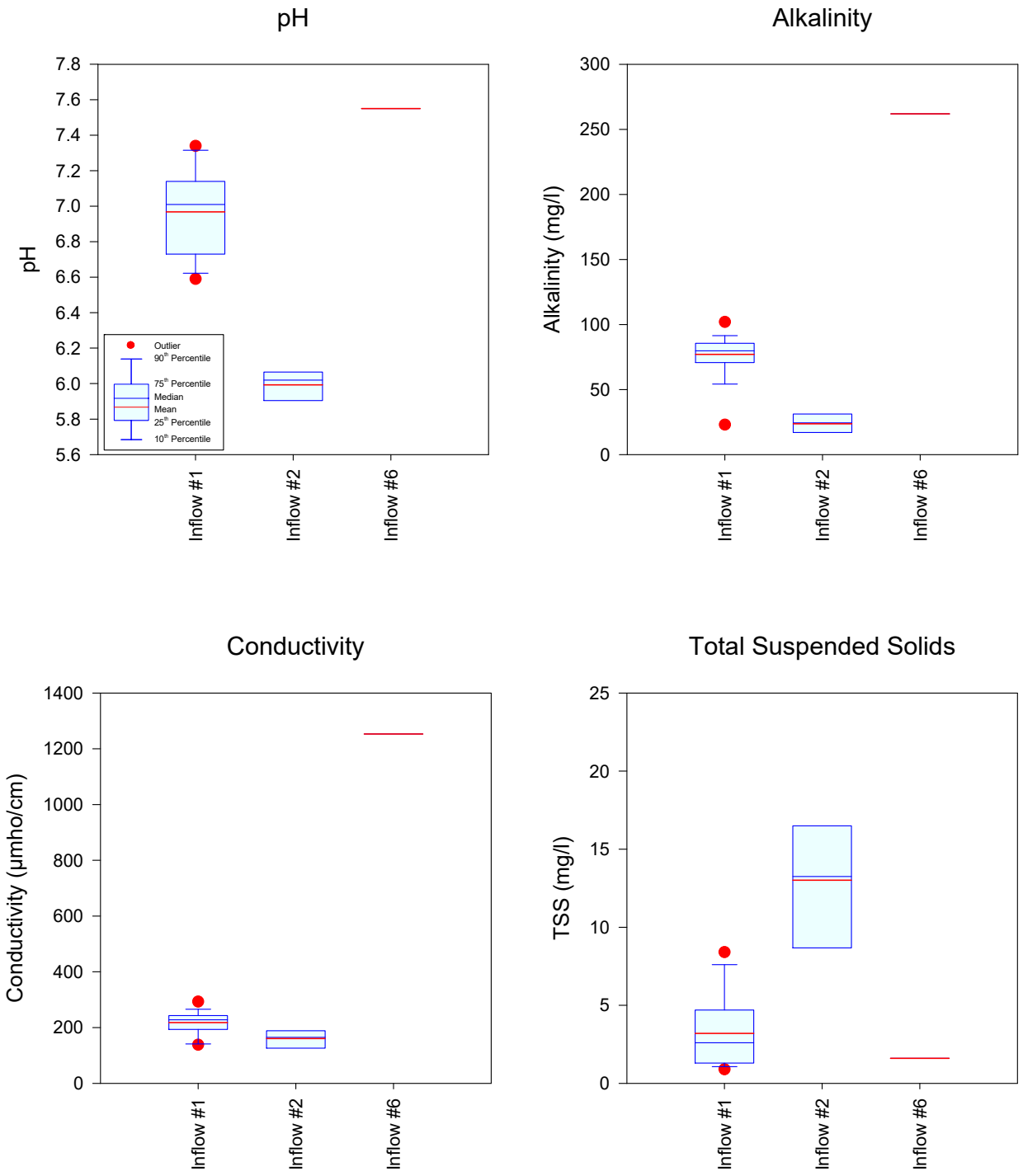


Figure 5-12. Statistical Summary of Measured Values of pH, Alkalinity, Conductivity, and TSS in Runoff Samples Collected from the Lake Yale Drainage Basin.

A statistical summary of measured concentrations of nitrogen species in runoff samples collected from the Lake Yale drainage basin is given on Figure 5-13. A moderate degree of variability was observed in measured ammonia concentrations at inflow Site 1, with a somewhat higher degree of variability observed in samples collected at inflow Site 2. The one sample collected at Site 6 exhibited a low value for ammonia. Low concentrations were also observed for NO_x at each of the three monitoring sites, although more elevated values for NO_x were observed on several occasions at both Sites 1 and 2. Measured concentrations of particulate nitrogen at the three monitoring sites were generally low in value, with concentrations ranging from approximately 50-300 μg/l at inflow Site 1, 200-600 μg/l at inflow Site 2, and a single measurement of approximately 128 μg/l at inflow Site 6. A similar pattern was also observed for total nitrogen which exhibited relatively consistent and low concentrations at Site 1, with higher values and a higher degree of variability observed in total nitrogen measurements conducted at Site 2.

A statistical summary of measured concentrations of phosphorus species in runoff samples collected from the Lake Yale drainage basin is given in Figure 5-14. Measured SRP concentrations at Site 1 exhibited moderately elevated values and a moderate degree of variability in measurements between the individual monitoring events. SRP concentrations at Site 2 exhibited both a lower concentration and lower degree of variability in measured values. However, an extremely elevated SRP value of approximately 1,800 μg/l was observed at Site 6. A similar pattern was observed for measured concentrations of dissolved organic phosphorus, with low values and a low degree of variability observed at inflow Sites 1 and 2, and a substantially higher value measured at Site 6. Observed patterns in concentrations of particulate phosphorus are similar to patterns observed for dissolved organic phosphorus, with low concentrations and a low degree of variability observed at Sites 1 and 2 and a substantially elevated particulate phosphorus value observed at Site 6. Overall, measured concentrations of total phosphorus at Sites 1 and 2 were relatively consistent in value throughout the field monitoring program, with a highly elevated total phosphorus value exceeding 8,300 μg/l observed at Site 6.

A statistical summary of measured values for turbidity and color in runoff samples collected from the Lake Yale drainage basin is given in Figure 5-15. Overall, measured turbidity values were low at each of the three monitoring sites, with a slightly higher degree of variability in measured values observed at inflow Site 2. In contrast, measured color values were elevated at each of the three sites, with overall geometric mean values ranging from 94-404 Pt-Co units.

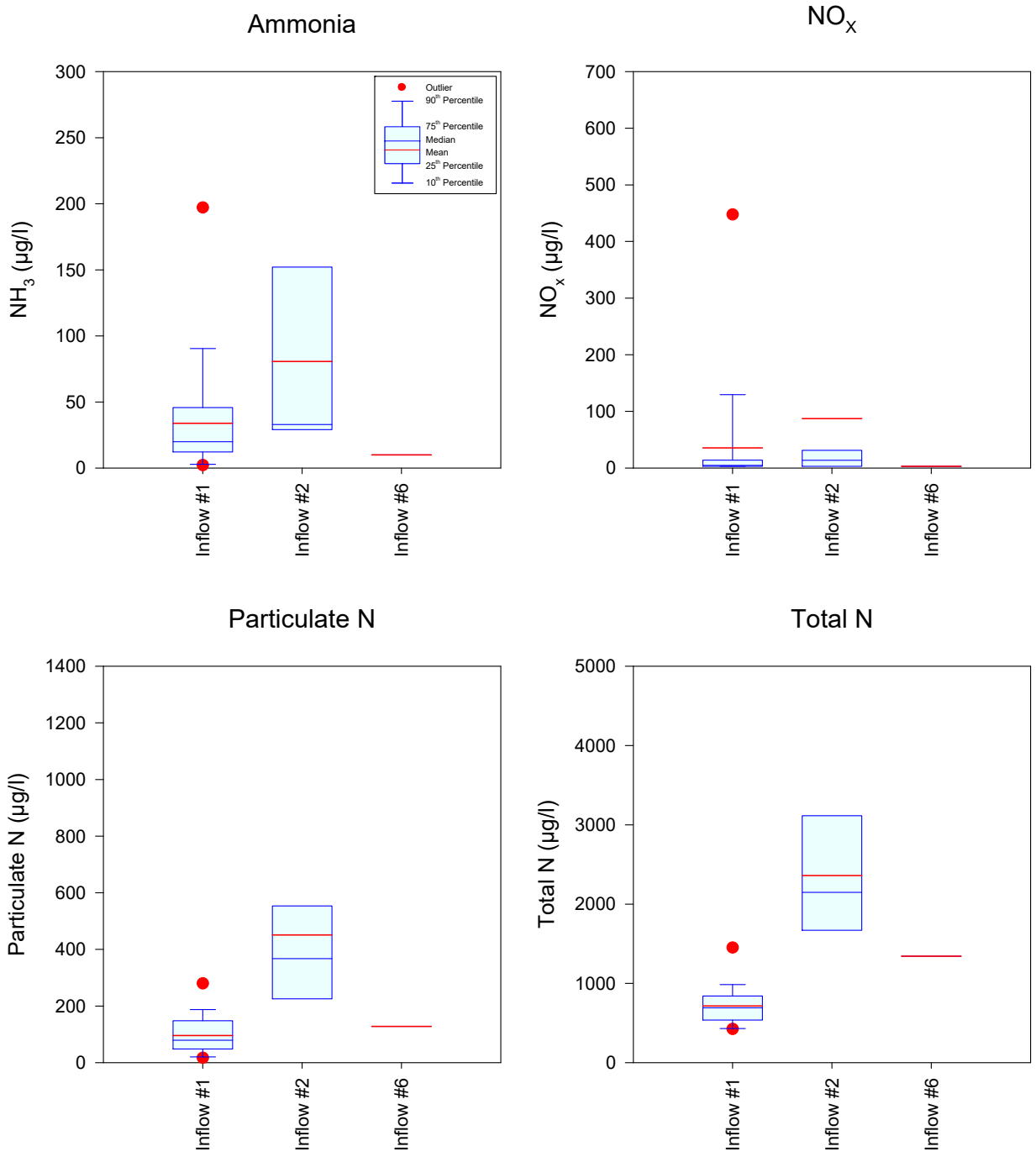


Figure 5-13. Statistical Summary of Measured Values of Nitrogen Species in Runoff Samples Collected from the Lake Yale Drainage Basin.

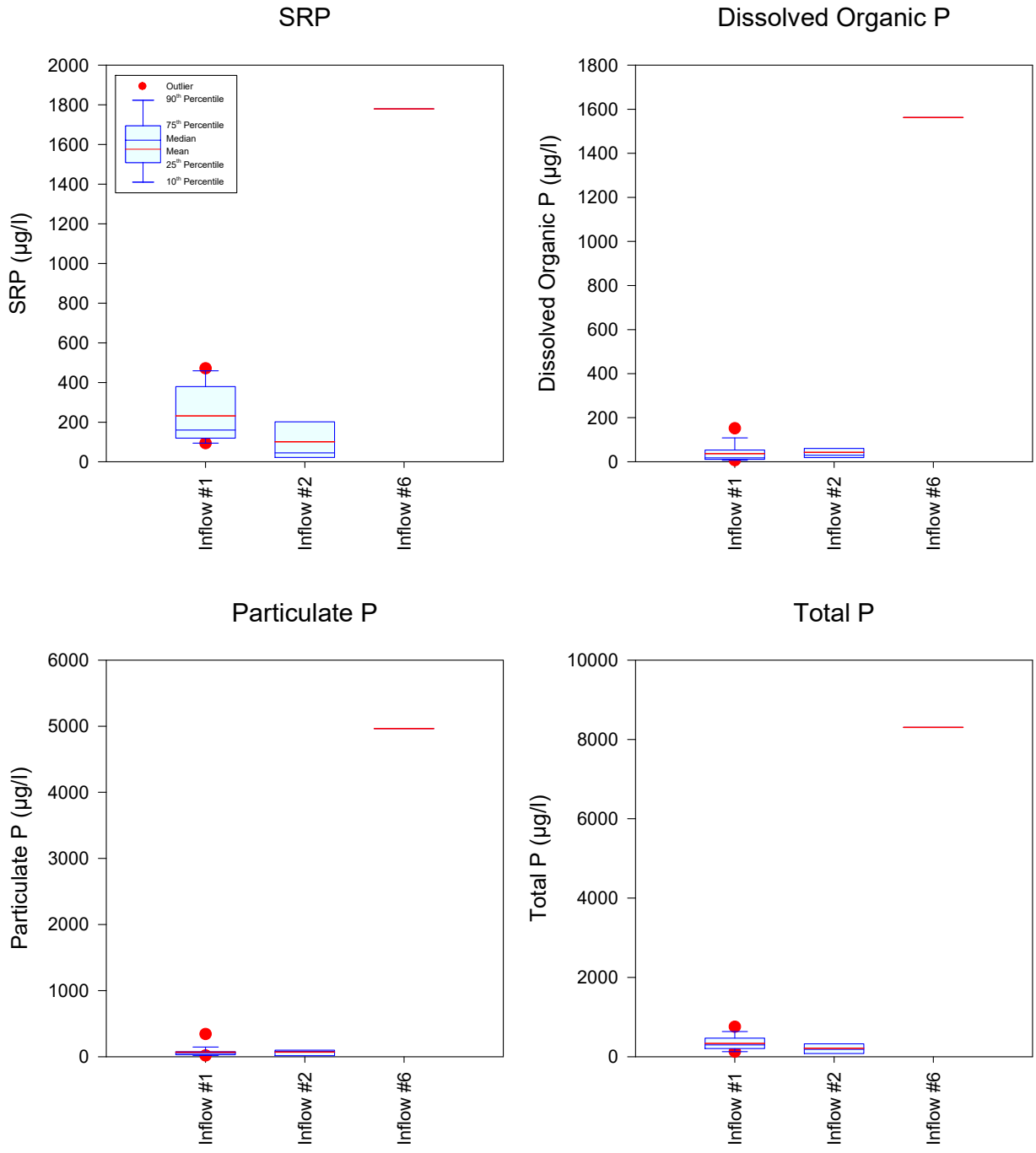


Figure 5-14. Statistical Summary of Measured Values of Phosphorus Species in Runoff Samples Collected from the Lake Yale Drainage Basin.

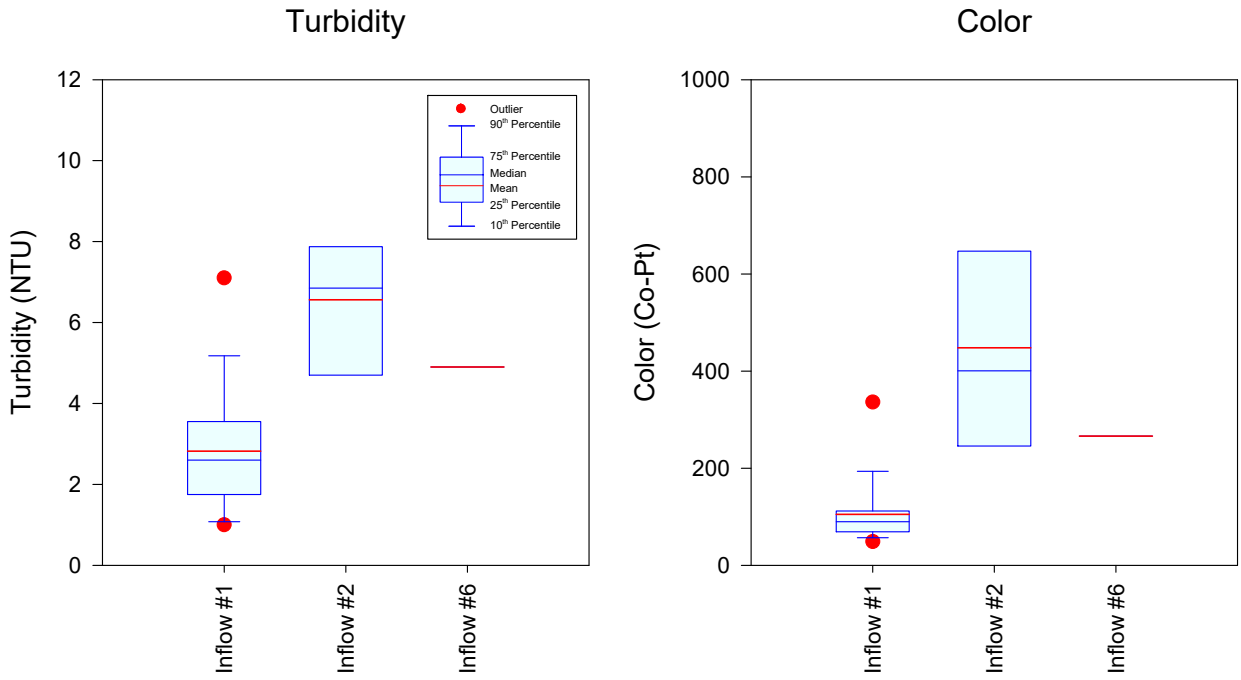


Figure 5-15. Statistical Summary of Measured Values of Turbidity and Color in Runoff Samples Collected from the Lake Yale Drainage Basin.

5.1.2.2.2 Trout Lake

A summary of the inflow and outflow samples collected at the Trout Lake monitoring sites during the field monitoring program is given on Figure 5-16. Samples were collected at 5 of the 7 proposed monitoring sites during the field monitoring program, with 4 composite samples collected at Site 1, 1 sample at Site 3, 3 samples at the Nature Center site, 16 samples at the Hicks Ditch site, and 21 samples collected at the lake outflow. No runoff samples were collected at Sites 2 and 4 during the field monitoring program. Overall, a total of 45 separate runoff samples was collected at the Trout Lake monitoring sites.

A tabular summary of geometric mean characteristics of inflow/outflow samples at the Trout Lake monitoring sites is given on Table 5-5. Overall, the characteristics of inflow samples collected in the Trout Lake drainage basin were relatively similar in value, particularly in comparison with the large range of values measured in inflow samples collected within the Lake Yale drainage basin.

Inflow/outflow samples collected in the Trout Lake drainage basin exhibited neutral to slightly acidic pH values, with geometric mean values ranging from 5.62-7.02. The inflow/ outflow samples were also characterized by moderate to low alkalinity, with geometric mean measurements ranging from 7.1-44.2 mg/l. Measured conductivity values were generally low compared with measurements commonly observed in urban runoff, ranging from 113-185 μmho/cm.



Figure 5-16. Number of Runoff Samples Collected at the Trout Lake Inflow/Outflow Monitoring Sites.

TABLE 5-5

CHARACTERISTICS OF INFLOW / OUTFLOW SAMPLES AT THE TROUT LAKE MONITORING SITES

PARAMETER	UNITS	SUB-BASIN / SITE				
		Hicks Ditch	TLW Nature Center	TL 01-02 Inflow 3	TL 04-05 Inflow 1	Outfall
Number of Samples	--	16	3	1	4	21
pH	s.u.	6.01	6.80	6.73	5.62	7.02
Alkalinity	mg/l	19.7	44.2	20.0	7.1	43.1
Conductivity	µmho/cm	124	113	123	114	185
Ammonia	µg/l	53	9	20	30	84
NO_x	µg/l	8	6	3	7	114
Dissolved Organic Nitrogen	µg/l	1,196	474	541	850	898
Particulate Nitrogen	µg/l	95	138	27	214	201
Total Nitrogen	µg/l	1,388	635	591	1,132	1.636
SRP	µg/l	40	19	4	83	190
Dissolved Organic Phosphorus	µg/l	24	9	24	30	21
Particulate Phosphorus	µg/l	18	11	4	17	39
Total Phosphorus	µg/l	101	52	32	137	263
Turbidity	NTU	3.0	4.4	1.8	3.0	3.7
Color	Pt-Co	285	120	219	326	194
TSS	mg/l	5.1	4.4	1.6	3.9	5.1

Each of the four inflow sites was characterized by low geometric mean values for both ammonia and NO_x, with more elevated values for these parameters measured at the Trout Lake outflow. The dominant nitrogen species measured at each of the sites is dissolved organic nitrogen which comprised 75-92% of the total nitrogen measured at each of the four inflow sites and 55% of the total nitrogen measured at the Trout Lake outflow. Overall, total nitrogen concentrations were low to moderate in value, with inflow monitoring sites ranging from 591-1,388 μg/l and a geometric mean of 1,636 μg/l at the Trout Lake outflow.

Measured concentrations of phosphorus species were low to moderate in value at each of the Trout Lake monitoring sites. Geometric mean SRP values at the four inflow sites ranged from 4-83 μg/l, with a somewhat more elevated mean value of 190 μg/l observed at the Trout Lake outflow site. Measured concentrations of dissolved organic phosphorus and particulate phosphorus were generally low in value and, with the exception of inflow Site 3, reflect a relatively small proportion of the overall total phosphorus measured. Measured concentrations of total phosphorus were also low in value, with geometric means ranging from 32-137 μg/l at the inflow monitoring sites, and a substantially higher value of 263 μg/l observed in the Trout Lake outflow. The dominant phosphorus species at 4 of the 5 monitoring sites appears to be SRP, with dissolved organic phosphorus contributing the largest phosphorus fraction at Site 3.

Measured values for turbidity and TSS were generally low at each of the inflow and outflow monitoring sites. Samples collected at each of the inflow and outflow sites were highly colored, with mean color values ranging from 120-326 Pt-Co units.

A graphical comparison of measured values of pH, alkalinity, conductivity, and TSS in runoff samples collected from the Trout Lake drainage basin is given on Figure 5-17. Measured pH values at each of the inflow sites were equal to or less than 7, with the lowest observed pH values measured at inflow Site 1 which is located in the residential canal on the north side of Trout Lake. Measured alkalinity values were moderate to low in value, with the highest alkalinity measurements at the Nature Center site and the lowest measurements at the inflow Site 1 residential canal. In contrast, measured conductivity values were relatively similar between the four inflow monitoring sites, with a high degree of variability in measured values observed at inflow Site 1. Measured TSS concentrations were generally low in value at each of the four inflow sites, with the vast majority of measurements less than 10 mg/l.

A graphical summary of measured concentrations of nitrogen species in inflow samples collected from the Trout Lake drainage basin is given on Figure 5-18. Measured concentrations of both ammonia and NO_x were low in value at each of the inflow monitoring sites, with the vast majority of measurements for both parameters less than 50 μg/l. Low to moderate levels of particulate nitrogen were observed at each of the inflow monitoring sites, with the highest values measured at inflow Site 1. Overall, measured concentrations of total nitrogen were moderate to low in value, with the most elevated concentrations observed in Hicks Ditch and the lowest values observed at the Nature Center site.

A statistical summary of measured concentrations of phosphorus species in runoff samples collected from the Trout Lake drainage basin is given on Figure 5-19. Relatively elevated concentrations of SRP were observed at the Hicks Ditch, Nature Center, and inflow Site 1 monitoring sites, with a much lower value observed at inflow Site 3. Concentrations of dissolved organic phosphorus were generally low in value and similar in concentration at the four inflow sites. Low values were also observed for particulate phosphorus, with similar measurements at the Hicks Ditch, Nature Center, and inflow 1 monitoring sites, and a substantially lower value at inflow Site 3. Overall, a relatively high degree of variability was observed in measured values for total phosphorus at Hicks Ditch, Nature Center, and inflow 1 monitoring sites during the field monitoring program. A lower concentration for total phosphorus was observed at inflow Site 3.

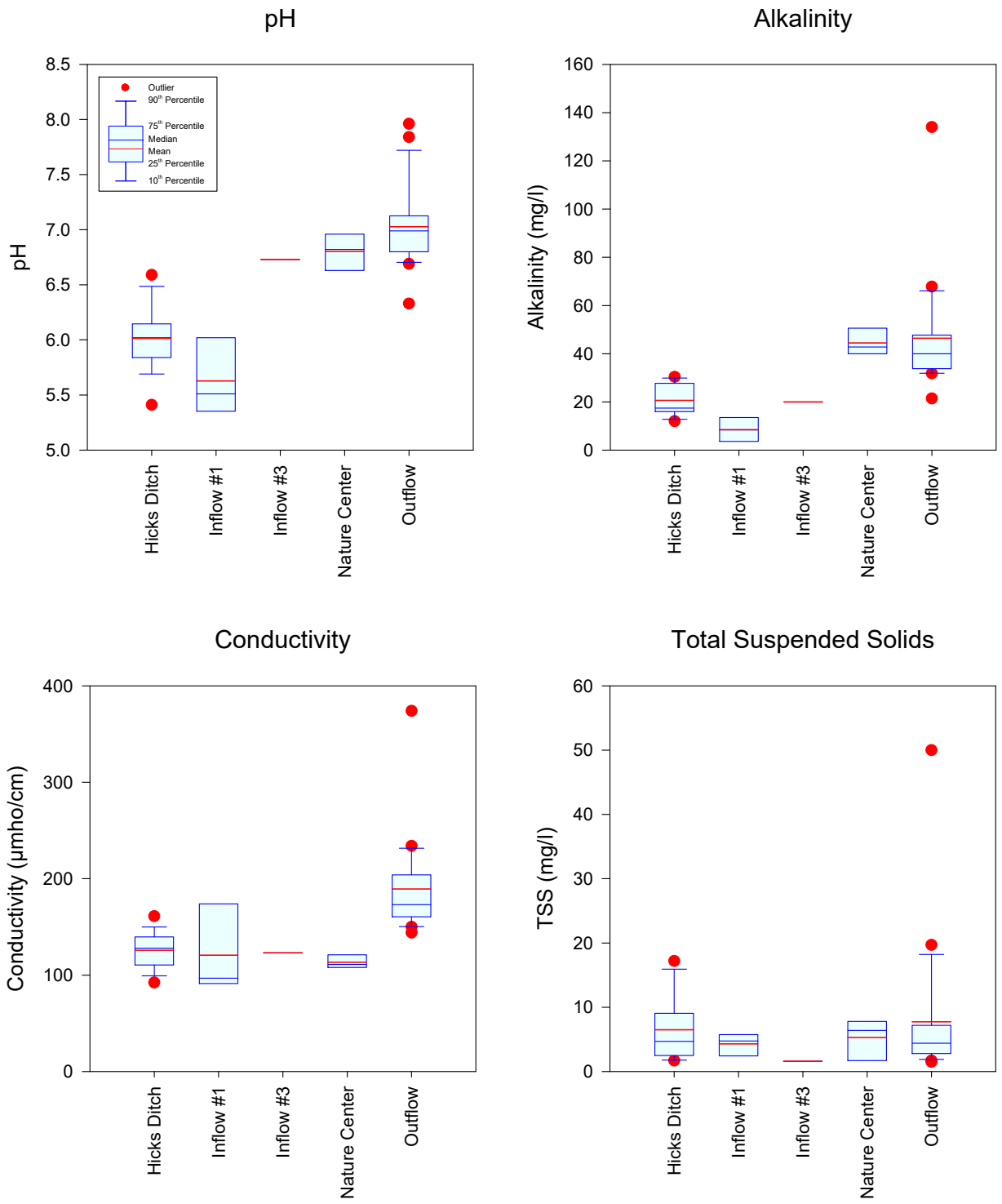


Figure 5-17. Statistical Summary of Measured Values of pH, Alkalinity, Conductivity, and TSS in Runoff Samples Collected from the Trout Lake Drainage Basin.

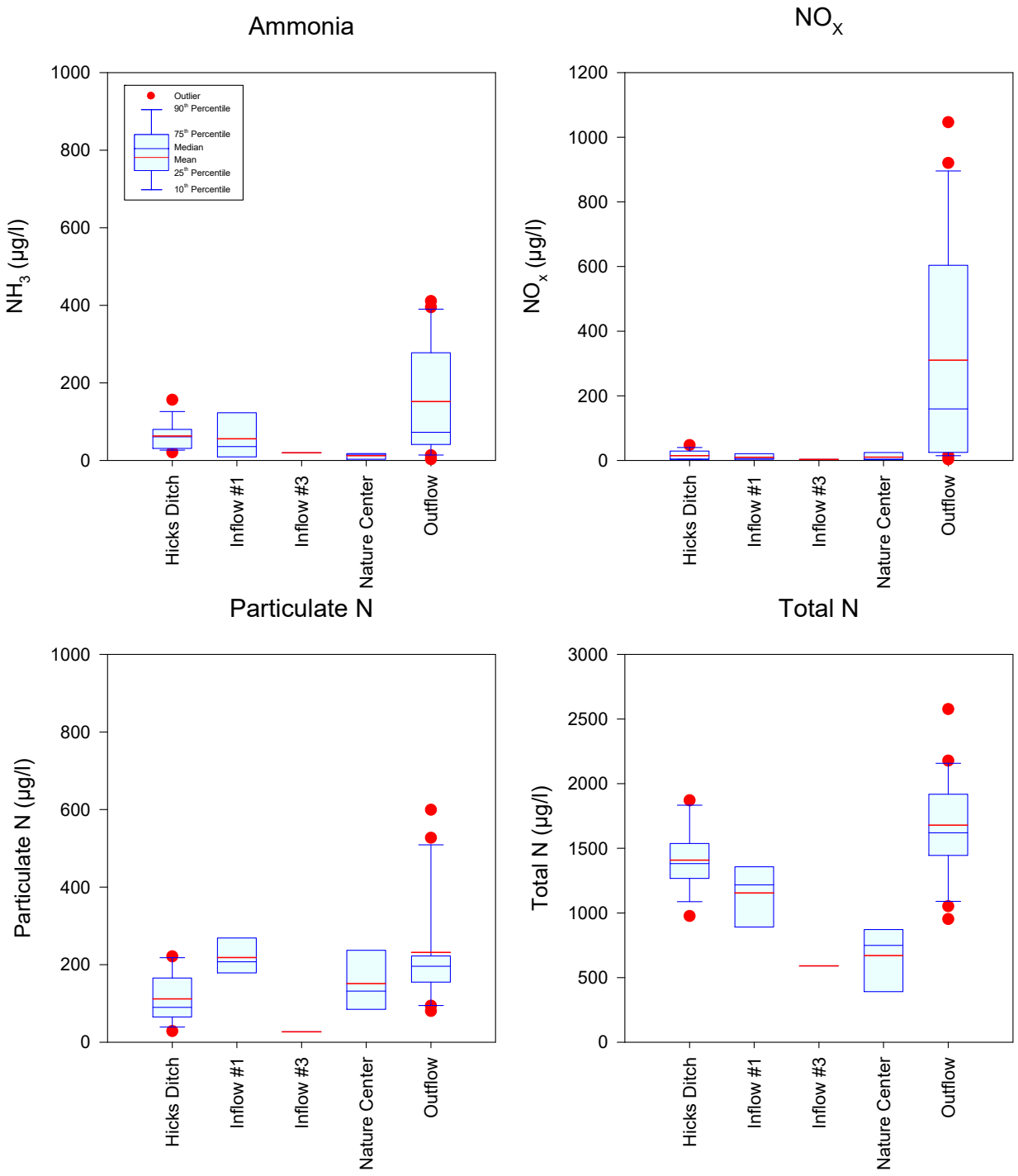


Figure 5-18. Statistical Summary of Measured Values of Nitrogen Species in Runoff Samples Collected from the Trout Lake Drainage Basin.

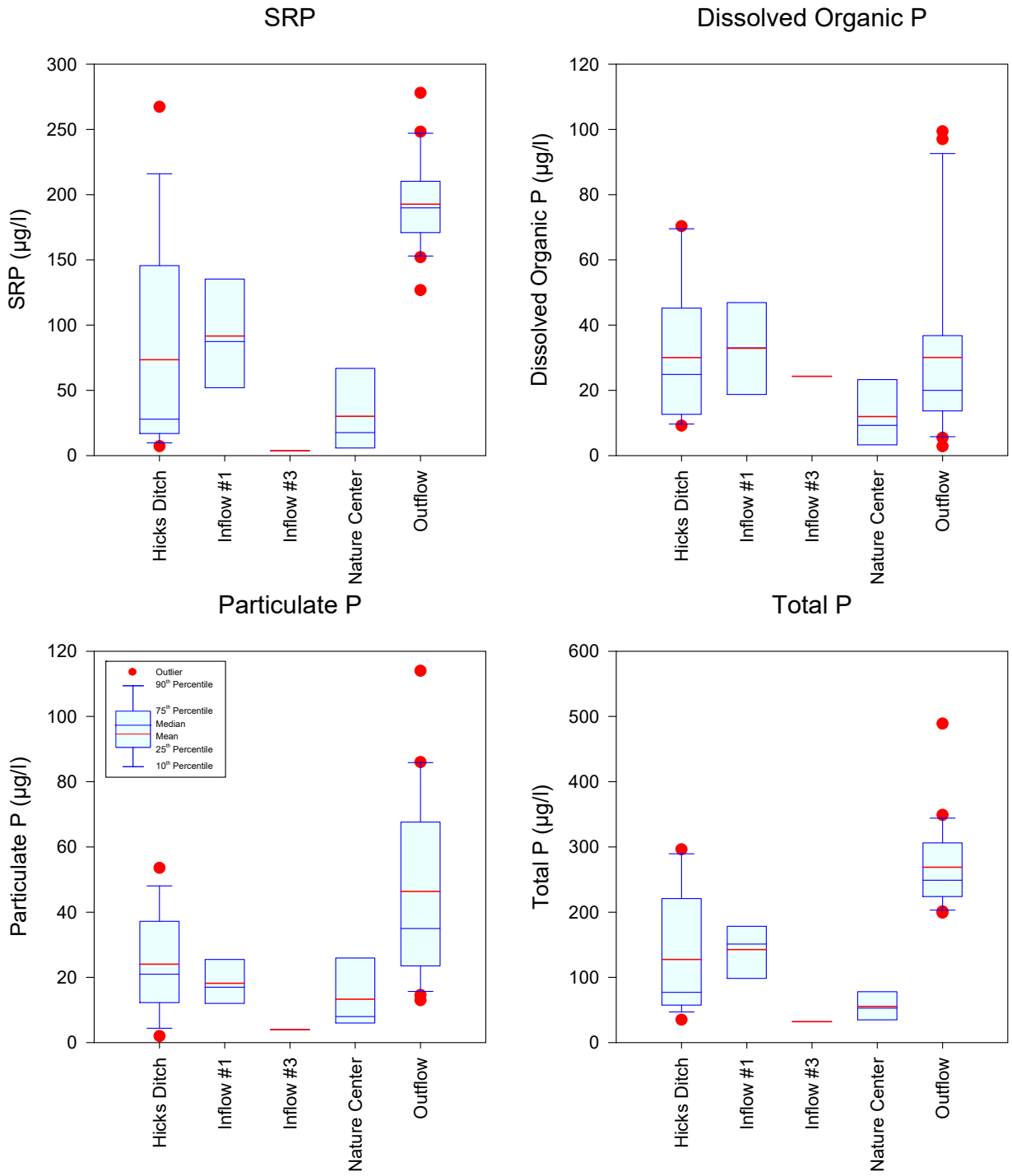


Figure 5-19. Statistical Summary of Measured Values of Phosphorus Species in Runoff Samples Collected from the Trout Lake Drainage Basin.

A graphical comparison of measured values for turbidity and color in inflow samples collected from the Trout Lake drainage basin during the field monitoring program is given on Figure 5-20. Relatively similar turbidity measurements were observed at each of the four inflow sites, with the vast majority of measured turbidity values less than 10 NTU. In contrast, elevated color values were observed at each of the four sites during the field monitoring program.

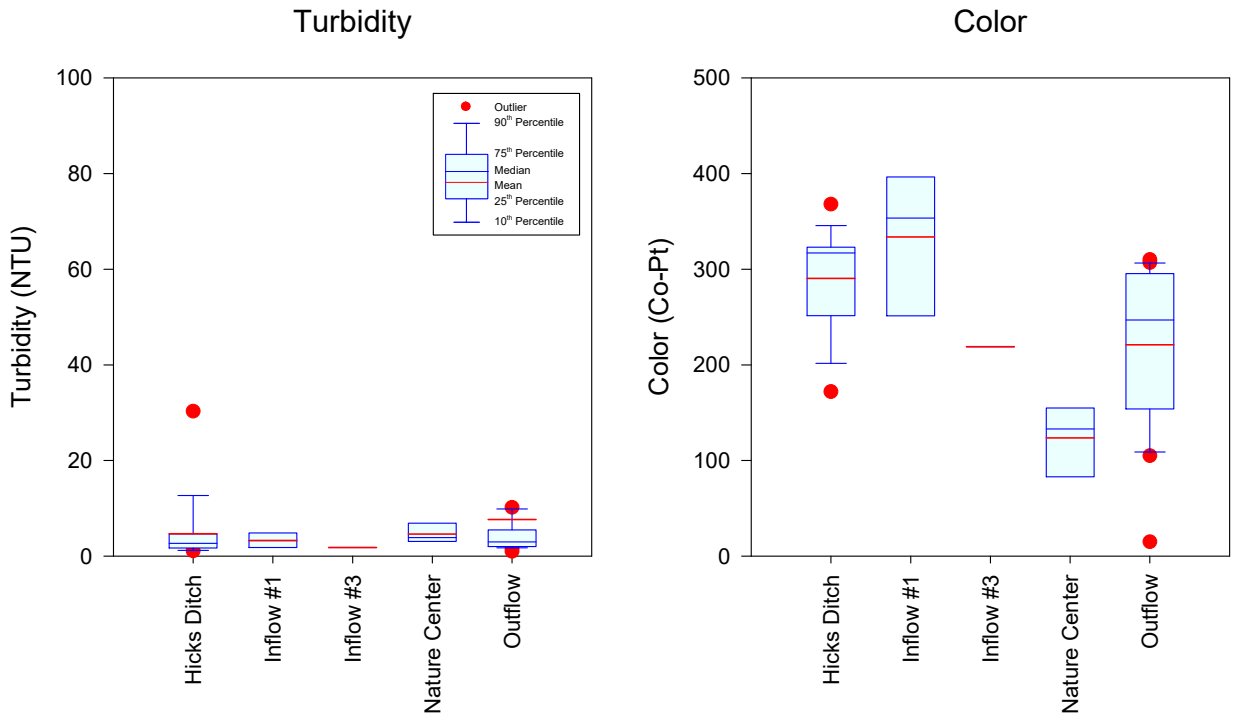


Figure 5-20. Statistical Summary of Measured Values of Turbidity and Color in Runoff Samples Collected from the Trout Lake Drainage Basin.

5.1.2.3 Selection of Runoff Characterization Data

In addition to the estimates of volumetric inputs of stormwater runoff into Lake Yale and Trout Lake, runoff characterization data for total nitrogen, total phosphorus, and TSS are also necessary to estimate annual loadings to the two lakes from stormwater runoff. Field monitoring of runoff inflows were conducted for multiple sub-basins discharging to Lake Yale and Trout Lake, and these data are used to reflect runoff characteristics discharging to each of the two lakes from the monitored sub-basin areas. Many of the sub-basins which were not monitored are adjacent to sub-basin areas which were measured directly and have similar watershed and land use characteristics. Runoff characteristics for these sub-basin areas are assumed to be similar to characteristics measured in the adjacent sub-basin areas. Runoff characteristics for sub-basin areas which were not monitored and have land use characteristics substantially different from a monitored sub-basin are assigned runoff characteristics based upon information contained in the Florida Runoff emc database which is maintained by ERD for FDEP. Assumptions regarding runoff characteristics for Lake Yale and Trout Lake sub-basin areas are discussed in the following sections.

A summary of runoff emc assumptions for non-monitored sub-basin areas in the Lake Yale and Trout Lake drainage basins is given in Table 5-6. The listed land uses reflect dominant land use categories within the two drainage basins which were not directly monitored as part of this project and contributes substantial portions of non-monitored drainage basin areas. The information summarized in this table reflect current emc values contained in the Florida Runoff emc database, along with data collected by ERD as part of a natural area monitoring project conducted for FDEP.

TABLE 5-6

RUNOFF emc ASSUMPTIONS FOR NON-MONITORED SUB-BASINS

LAND USE	RUNOFF emc (mg/l)			REFERENCE / ASSUMPTIONS
	Total N	Total P	TSS	
LDR	1.510	0.178	5.0	Runoff emc Database
MDR	1.870	0.301	5.0	Runoff emc Database
Mobile Home	1.510	0.178	5.0	Assumed similar to LDR
Highway	1.370	0.167	5.0	Runoff emc Database
Institutional	1.070	0.179	5.0	Assumed similar to Low Int. Comm.
Citrus	2.070	0.152	15.5	Runoff emc Database
Pasture	3.300	0.621	27.5	Runoff emc Database
Upland Mixed	0.900	0.271	8.3	Natural area monitoring project emc
Wet Prairie	1.055	0.012	2.5	Natural area monitoring project emc
Wetland	0.635	0.052	4.4	Assumed similar to Nature Center

5.1.2.3.1 Lake Yale

A summary of assumed runoff characteristics for major sub-basin areas discharging to Lake Yale is given in Table 5-7. Runoff concentration data are provided for each of the 42 sub-basin areas based upon direct measurements, measurements conducted in adjacent sub-basin areas with similar land use characteristics, and information obtained from the Florida Runoff emc database. Sub-basin areas which were not directly monitored or which are not similar to monitored sub-basins are assumed to have runoff characteristics similar to the dominant land use within the sub-basin. If a particular land use comprises 70% or more of the overall sub-basin area, then runoff characteristics generated from the sub-basin are assumed to be similar to the dominant land use category. In sub-basins with multiple dominant land use categories, runoff characteristics are assumed to be the mean of runoff values for the top two dominant land use characteristics within the basin. The information summarized in Table 5-7 is used in a subsequent section for estimation of runoff loadings to Lake Yale.

TABLE 5-7

ASSUMED RUNOFF CHARACTERISTICS FOR LAKE YALE SUB-BASIN AREAS

SUB BASIN	GENERATED RUNOFF VOLUME (ac-ft/yr)	RUNOFF CONCENTRATION (mg/l)			RUNOFF CONCENTRATION REFERENCE
		Total N	Total P	TSS	
Lake Yale Slough	337	0.635	0.052	4.4	Assumed similar to Nature Center Site
LYW 01-01	833	0.635	0.052	4.4	Assumed similar to Nature Center Site
LYD 01-01	20.1	1.205	0.225	6.7	Mobile home/mixed upland
LYD 02-01	85.2	1.510	0.178	5.0	Mobile home/Low-density residential
LYD 03-01	17.0	1.510	0.178	5.0	Mobile home
LYD 04-01	1.7	1.370	0.167	5.0	Highway
LYD 05-01	1.6	1.205	0.225	6.7	Upland mixed/low-density residential
LYD 06-01	1.2	1.205	0.225	6.7	Upland mixed/low-density residential
LYD 07a-01	3.9	0.900	0.271	8.3	Upland mixed forest
LYD 07b-01	5.0	2.685	0.387	21.5	Citrus/pasture
LYD 08-01	2.5	2.070	0.152	15.5	Citrus
LYD 09-01	38.7	2.225	0.166	12.3	Assumed similar to Site 2
LYD 10-01	11.3	0.978	0.142	5.4	Upland mixed/wet prairies
LYD 11-01	220	2.225	0.166	12.3	Assumed similar to Site 2
LYD 12-01	151	2.225	0.166	12.3	Direct measurement at Site 2
LYD 13-01	273	0.683	0.291	2.5	Direct measurement at Site 1
LYD 14-01	14.3	1.342	8.305	1.6	Direct measurement at Site 6
LYD 15-01	1.3	0.978	0.142	5.4	Upland mixed/wet prairies
LYD 16-01	17.7	1.253	0.177	4.7	Medium-density residential/wetlands
LYD 17-01	25.3	1.385	0.286	6.7	Medium-density residential/upland mixed
LYD 18-01	7.3	1.385	0.286	6.7	Medium-density residential/upland mixed
LYD 19-01	63.7	1.385	0.286	6.7	Medium-density residential/upland mixed
LYD 20-01	4.2	2.070	0.152	15.5	Citrus
LYD 21-01	10.8	2.070	0.152	15.5	Citrus
LYD 22-01	7.9	2.070	0.152	15.5	Citrus
LYD 23-01	0.6	2.070	0.152	15.5	Citrus
LYD 24-01	0.5	2.070	0.152	15.5	Citrus
LYD 25-01	1.6	2.070	0.152	15.5	Citrus
LYD 26-01	10.6	2.685	0.387	21.5	Citrus/pasture
LYD 27-01	1.3	3.300	0.621	27.5	Pasture
LYD 28-01	19.7	1.968	0.337	16.0	Pasture/wetland
LYD 29-01	3.8	1.510	0.178	5.0	Mobile home
LYD 30-01	3.1	1.510	0.178	5.0	Mobile home
LYD 31-01	1.5	1.510	0.178	5.0	Mobile home
LYD 32-01	0.5	1.510	0.178	5.0	Mobile home
LYD 33-01	21.1	1.510	0.178	5.0	Mobile home
LYD 34-01	3.3	0.900	0.271	8.3	Upland mixed forest
LYD 35-01	0.7	1.070	0.179	5.0	Institutional
LYD 36-01	6.4	1.070	0.179	5.0	Institutional
LYD 37-01	1.1	1.070	0.179	5.0	Institutional
LYD 38-01	6.2	0.900	0.271	8.3	Upland mixed forest
Direct	17.6	1.253	0.072	7.5	Citrus/wet prairies/wetlands
Total:	**2,253**				

5.1.2.3.2 Trout Lake

A summary of assumed runoff characteristics for major sub-basin areas discharging to Trout Lake is given in Table 5-8. The majority of sub-basins discharging to Trout Lake were either monitored directly or are assumed to be similar to sub-basin areas which were monitored. The only sub-basin areas which used data from the Florida Runoff emc database are Trout Lake sub-basins 08-01 and 09-01 which reflect a small portion of the overall Trout Lake drainage basin.

TABLE 5-8

ASSUMED RUNOFF CHARACTERISTICS FOR TROUT LAKE SUB-BASIN AREAS

SUB-BASIN	GENERATED RUNOFF VOLUME (ac-ft/yr)	RUNOFF CONCENTRATION (mg/l)			RUNOFF CONCENTRATION REFERENCE
		Total N	Total P	TSS	
Hicks Ditch	1,256	1.388	0.101	5.1	Direct Measurement - Hicks Ditch at SR 44
TLW	325	0.635	0.052	4.4	Direct Measurement - Nature Center
TL 01-02	31.8	0.591	0.032	1.6	Direct Measurement - Inflow #3
TL 02-01	7.25	0.591	0.032	1.6	Assumed similar to inflow #3
TL 03-01	6.39	1.132	0.137	3.9	Direct Measurement - Inflow #1
TL 04-01	8.85	1.132	0.137	3.9	Assumed Similar to Inflow #1
TL 05-01	34.2	1.132	0.137	3.9	Assumed Similar to Inflow #1
TL 06-01	0.28	0.635	0.052	4.4	Assumed similar to Nature Center Site
TL 07-01	148	1.132	0.137	3.9	Assumed Similar to Inflow #1
TL 08-01	4.49	1.510	0.178	15.0	Rural Residential emc
TL 09-01	2.74	1.070	0.179	5.0	Low-Intensity Commercial emc
Direct	0.13	0.635	0.052	4.4	Assumed similar to Nature Center Site
Total:	**1,825.9**				

The characteristics of runoff inputs from Hicks Ditch are assumed to be the geometric mean value for the samples collected at the Hicks Ditch monitoring site at SR 44. However, discharges from Hicks Ditch migrate through the large wetland area on the east side of Trout Lake prior to discharging into the lake. Previous research conducted by ERD has demonstrated that hardwood wetlands can alter the characteristics of inflows into the wetland area provided that the inflows have a minimum detention time of approximately 48 hours. After entering the wetland area, inflows from Hicks Ditch travel approximately 3,500 ft before discharging into Trout Lake. Even if the inflow traveled at a relatively slow rate of 0.1 fps, the travel time for Trout Lake inflows through the wetland would be less than 10 hours. Under this relatively short detention time, relatively little change would be anticipated for the inputs from Hicks Ditch, so the monitored runoff characteristics from Hicks Ditch are assumed to be similar to the characteristics of water which actually discharges into Trout Lake.

5.1.2.4 Mass Loadings

Estimates of annual mass loadings of total nitrogen, total phosphorus, and TSS discharging into Lake Yale and Trout Lake as a result of stormwater runoff were calculated using the assumed runoff characteristics summarized in Tables 5-7 and 5-8 and the generated runoff volumes for each of the individual sub-basin areas summarized in Tables 4-6 and 4-7. A summary of mass loadings discharging to Lake Yale and Trout Lake from stormwater runoff is given in the following sections.

5.1.2.4.1 Lake Yale

A summary of estimated annual runoff generated loadings of total nitrogen, total phosphorus, and TSS to Lake Yale is given in Table 5-9. The mass loadings summarized in this table were obtained by multiplying the assumed runoff characteristics for Lake Yale sub-basins (summarized in Table 5-7) times the observed runoff volumes for each Lake Yale sub-basin (summarized in Table 4-6). The values summarized in Table 5-9 reflect mean annual mass loadings.

On an average annual basis, stormwater runoff contributes approximately 3,012 kg/yr of total nitrogen to Lake Yale. The largest single contribution of total nitrogen to Lake Yale originates within the Lake Yale wetland sub-basin which contributes approximately 21.7% of the annual runoff generated loadings to the lake. Approximately 20% of the annual runoff generated loadings originate within sub-basin LYD 11-01 which is located in the southeast portion of Lake Yale, with 8.8% of the annual runoff generated loadings of total nitrogen originate within the Lake Yale Slough, 7.6% contributed by sub-basin LYD 13-01, and 5.3% contributed by sub-basin LYD 02-01. Approximately 3.6% and 3.5% of the annual loadings are generated within sub-basins LYD 19-01 and LYD 09-01, respectively. Each of the remaining sub-basin areas contributes approximately 1% or less of the average annual runoff generated nitrogen loadings to the lake.

On an average annual basis, stormwater runoff contributes approximately 509 kg/yr of total phosphorus to Lake Yale. The largest source of runoff generated phosphorus loadings to Lake Yale appears to be sub-basin LYD 14-01 which is the sub-basin area that includes the Eustis Commerce Park. This sub-basin was included in the field monitoring program and a single sample was collected which indicated an extremely elevated total phosphorus concentration within this sub-basin. This elevated total phosphorus concentration is responsible for the apparently elevated significance of this sub-basin in comparison with sub-basins that are substantially larger in size. Approximately 19% of the runoff generated phosphorus loadings originate within sub-basin LYD 13-01, located on the southeast side of Lake Yale, with 10.5% contributed by the Lake Yale wetland, 8.9% by sub-basin LYD 11-01 (located on the southeast side of Lake Yale), 6.1% contributed by sub-basin LYD 12-01 (located on the southeast side), 4.4% from sub-basin LYD 19-01, and 3.7% from sub-basin LYD 02-01. Each of the remaining sub-basin areas contributes approximately 1.8% or less of the runoff generated phosphorus loadings to Lake Yale.

The largest runoff generated loadings of suspended solids to Lake Yale appears to originate within the Lake Yale wetland which contributes 26.4% of the annual solids loading of 17,146 kg/yr from runoff. Approximately 19.5% of the annual runoff generated TSS loading is contributed by sub-basin LYD 11-01, with 13.3% contributed by sub-basin LYD 12-01, both of which are located in the southeast portion of Lake Yale. The Lake Yale Slough contributes approximately 10.7% of the annual TSS runoff generated loadings, with 3.4% contributed by sub-basin LYD 09-01 and 3.0% contributed by sub-basin LYD 19-01. Each of the remaining sub-basin areas contributes approximately 1.6% or less of the annual runoff generated loadings of suspended solids.

TABLE 5-9

ESTIMATED ANNUAL RUNOFF LOADINGS TO LAKE YALE

SUB-BASIN	AREA (acres)	MASS LOADING (kg/yr)			FRACTION OF TOTAL LOADING (%)			AREAL MASS LOADING (kg/ac-yr)		
		Total N	Total P	TSS	Total N	Total P	TSS	Total N	Total P	TSS
Lake Yale Slough	6,362.6	263.9	21.6	1,829	8.8	4.2	10.7	0.04	0.00	0.29
LYW 01-01	4,205.8	652.2	53.4	4,520	21.7	10.5	26.4	0.16	0.01	1.07
LYD 01-01	68.1	29.8	5.6	165	1.0	1.1	1.0	0.44	0.08	2.42
LYD 02-01	196.3	158.7	18.7	525	5.3	3.7	3.1	0.81	0.10	2.68
LYD 03-01	22.3	31.6	3.7	105	1.1	0.7	0.6	1.42	0.17	4.70
LYD 04-01	3.9	2.9	0.4	11	0.1	0.1	0.1	0.75	0.09	2.72
LYD 05-01	11.7	2.4	0.4	13	0.1	0.1	0.1	0.20	0.04	1.12
LYD 06-01	17.5	1.8	0.3	10	0.1	0.1	0.1	0.10	0.02	0.57
LYD 07a-01	75.3	4.3	1.3	40	0.1	0.3	0.2	0.06	0.02	0.53
LYD 07b-01	69.8	16.6	2.4	133	0.6	0.5	0.8	0.24	0.03	1.90
LYD 08-01	43.4	6.5	0.5	48	0.2	0.1	0.3	0.15	0.01	1.11
LYD 09-01	152.1	106.2	7.9	587	3.5	1.6	3.4	0.70	0.05	3.86
LYD 10-01	38.5	13.6	2.0	75	0.5	0.4	0.4	0.35	0.05	1.95
LYD 11-01	639.5	603.8	45.1	3,338	20.0	8.9	19.5	0.94	0.07	5.22
LYD 12-01	399.7	413.1	30.8	2,284	13.7	6.1	13.3	1.03	0.08	5.71
LYD 13-01	757.1	229.5	97.8	840	7.6	19.2	4.9	0.30	0.13	1.11
LYD 14-01	97.0	23.7	146.8	28	0.8	28.8	0.2	0.24	1.51	0.29
LYD 15-01	16.7	1.6	0.2	9	0.1	0.0	0.1	0.10	0.01	0.53
LYD 16-01	148.9	27.4	3.9	103	0.9	0.8	0.6	0.18	0.03	0.69
LYD 17-01	51.3	43.3	8.9	208	1.4	1.8	1.2	0.84	0.17	4.05
LYD 18-01	10.2	12.4	2.6	59	0.4	0.5	0.3	1.21	0.25	5.83
LYD 19-01	291.3	108.8	22.5	522	3.6	4.4	3.0	0.37	0.08	1.79
LYD 20-01	80.7	10.8	0.8	81	0.4	0.2	0.5	0.13	0.01	1.00
LYD 21-01	231.7	27.5	2.0	206	0.9	0.4	1.2	0.12	0.01	0.89
LYD 22-01	160.2	20.1	1.5	150	0.7	0.3	0.9	0.13	0.01	0.94
LYD 23-01	23.2	1.6	0.1	12	0.1	0.0	0.1	0.07	0.01	0.53
LYD 24-01	7.3	1.1	0.1	9	0.0	0.0	0.1	0.16	0.01	1.18
LYD 25-01	40.9	4.0	0.3	30	0.1	0.1	0.2	0.10	0.01	0.72
LYD 26-01	223.0	35.0	5.0	281	1.2	1.0	1.6	0.16	0.02	1.26
LYD 27-01	14.8	5.2	1.0	44	0.2	0.2	0.3	0.35	0.07	2.96
LYD 28-01	232.6	47.8	8.2	388	1.6	1.6	2.3	0.21	0.04	1.67
LYD 29-01	7.5	7.1	0.8	24	0.2	0.2	0.1	0.95	0.11	3.14
LYD 30-01	5.9	5.7	0.7	19	0.2	0.1	0.1	0.96	0.11	3.19
LYD 31-01	2.5	2.8	0.3	9	0.1	0.1	0.1	1.10	0.13	3.65
LYD 32-01	2.6	0.9	0.1	3	0.0	0.0	0.0	0.33	0.04	1.09
LYD 33-01	108.1	39.3	4.6	130	1.3	0.9	0.8	0.36	0.04	1.20
LYD 34-01	22.4	3.7	1.1	34	0.1	0.2	0.2	0.17	0.05	1.53
LYD 35-01	9.3	1.0	0.2	5	0.0	0.0	0.0	0.10	0.02	0.49
LYD 36-01	55.4	8.4	1.4	39	0.3	0.3	0.2	0.15	0.03	0.71
LYD 37-01	15.4	1.5	0.3	7	0.0	0.0	0.0	0.10	0.02	0.46
LYD 38-01	42.6	6.9	2.1	64	0.2	0.4	0.4	0.16	0.05	1.49
Direct	434.1	27.2	1.6	162	0.9	0.3	0.9	0.06	0.00	0.37
Total:	**15,399.2**	**3,012**	**509**	**17,146**	**100**	**100**	**100**	**0.20**	**0.03**	**1.11**

	Denotes sub-basins with areal mass loading rates >50% above the mean	0.29	0.05	1.67

Calculated areal loading rates for each sub-basin area are also provided on Table 5-9. These values were obtained by dividing the mass loading for total nitrogen, total phosphorus, and TSS for each sub-basin by the total sub-basin area which allows an evaluation of pollutant loadings that is independent of the size of an individual sub-basin area. Mean areal loading rates for total nitrogen, total phosphorus, and TSS are provided in Table 5-9 for each of the lakes. Sub-basin areas which exceed the mean areal loading rates by more than 50% are highlighted in yellow and reflect loading "hot spots" within the overall Lake Yale drainage basin.

Higher than average areal loadings of total nitrogen, total phosphorus, and TSS were observed in Lake Yale sub-basins LYD 01-01, 02-01, 03-01, and 04-01, all of which are located on the northwest shore of the lake between the lake outfall canal and the Lake Yale Slough. Higher than average areal loadings for nitrogen, phosphorus, and TSS were also observed in sub-basins LYD 11-01, 12-01, and 13-01, all of which are located in the southeast portion of Lake Yale. Higher than normal areal loading rates were also observed in Lake Yale sub-basins LYD 17-01, 18-01, and 19-01, also located on the southeast side of Lake Yale, along with sub-basins LYD 27-01, LYD 29-01, 30-01, and 31-01, most of which are located in agricultural areas on the south side of Lake Yale, although these sub-basins contribute only a small portion of the annual runoff generated loadings to Lake Yale.

Overall, the most significant runoff generated loadings to Lake Yale appear to originate within the Lake Yale wetland sub-basin, along with sub-basins LYD 11-01, 12-01, and 13-01, all located on the southeast side of the lake. Combined together, these areas contribute approximately 63% of the annual runoff generated loadings of nitrogen to Lake Yale, 74% of the phosphorus loading, and 64% of the TSS loading.

5.1.2.4.2 Trout Lake

A summary of estimated annual runoff generated loadings of total nitrogen, total phosphorus, and TSS to Trout Lake is given in Table 5-10. The most significant source for runoff generated loadings of total nitrogen is Hicks Ditch which contributes approximately 79.0% of the annual nitrogen loadings. An additional 9.4% is contributed by the Trout Lake wetland, with 7.6% contributed by Trout Lake sub-basin 07-01 and 1.8% contributed by sub-basin 05-01. Each of the remaining sub-basin areas contributes 1% or less of the annual runoff generated nitrogen loading.

Hicks Ditch is also the most significant contributor of runoff generated phosphorus loadings, contributing 73.2% of the annual inputs. Approximately 11.7% of the annual phosphorus loadings originate within sub-basin 07-01 (located on the south side of Trout Lake), with 9.8% contributed by the Trout Lake wetland and 2.7% contributed by sub-basin TL 05-01. Each of the remaining sub-basin areas contributes approximately 1% or less of the annual runoff generated loadings.

Approximately 73.2% of the annual runoff generated TSS loadings to Trout Lake originate within Hicks Ditch, with 16.3% contributed by the Trout Lake wetland, 6.6% contributed by sub-basin 07-01, and 1.5% contributed by sub-basin 05-01. Each of the remaining sub-basin areas contributes approximately 1% or less of the annual suspended solids loadings.

TABLE 5-10

ESTIMATED ANNUAL RUNOFF LOADINGS TO TROUT LAKE

SUB-BASIN	AREA (acres)	MASS LOADING (kg/yr)			FRACTION OF TOTAL LOADING (%)			AREAL MASS LOADING (kg/ac-yr)		
		Total N	Total P	TSS	Total N	Total P	TSS	Total N	Total P	TSS
Hicks Ditch	7,579.2	2,151	156.5	7,903	79.0	73.2	73.2	1.71	0.12	6.29
TLW	1,102.4	255	20.9	1,765	9.4	9.8	16.3	0.78	0.06	5.43
TL 01-02	72.0	23.2	1.25	62.7	0.9	0.6	0.6	0.73	0.04	1.97
TL 02-01	16.0	5.3	0.29	14.3	0.2	0.1	0.1	0.73	0.04	1.97
TL 03-01	6.7	8.92	1.08	30.7	0.3	0.5	0.3	1.40	0.17	4.81
TL 04-01	8.5	12.4	1.50	42.6	0.5	0.7	0.4	1.40	0.17	4.81
TL 05-01	34.6	47.8	5.78	165	1.8	2.7	1.5	1.40	0.17	4.81
TL 06-01	22.7	0.22	0.02	1.5	0.0	0.0	0.0	0.78	0.06	5.43
TL 07-01	511.0	207	25.0	712	7.6	11.7	6.6	1.40	0.17	4.81
TL 08-01	30.6	8.36	0.99	83.1	0.3	0.5	0.8	1.86	0.22	18.50
TL 09-01	1.5	3.62	0.60	16.9	0.1	0.3	0.2	1.32	0.22	6.17
Direct	2.1	0.10	0.01	0.7	0.0	0.0	0.0	0.78	0.06	5.43
Totals:	**9,387.3**	2,722	213.9	10,797	100	100	100	1.49	0.12	5.91
	Denotes sub-basins with areal mass loading rates >50% above the mean							0.29	0.05	1.67

Higher than average areal loading rates for total phosphorus were observed in sub-basins 08-01 and 09-01, with a substantially higher than average areal loading for TSS observed in sub-basin 08-01. However, the overall contribution from each of these sub-basins is extremely small on an overall annual basis.

5.1.3 Groundwater Seepage

5.1.3.1 Chemical Characteristics

Nutrient influx from groundwater seepage was quantified using a series of underwater seepage meters installed in Lake Yale and Trout Lake. A discussion of the hydrologic inputs resulting from groundwater seepage is given in Section 4.1.3. Each of the collected groundwater seepage samples was analyzed in the ERD Laboratory for pH, alkalinity, conductivity, total nitrogen, total phosphorus, and color. A complete listing of laboratory measurements conducted on seepage samples collected in Lake Yale is given in Appendix I.1, with the characteristics of seepage samples collected in Trout Lake provided in Appendix I.2. A discussion of characteristics of seepage samples collected in each of the two lakes is given in the following sections.

5.1.3.1.1 Lake Yale

A tabular summary of mean characteristics of seepage samples collected in Lake Yale from June 2015-October 2016 is given on Table 5-11. The mean values listed in Table 5-11 reflect log-normal or geometric mean values since the data exhibit a log-normal distribution.

TABLE 5-11

GEOMETRIC MEAN CHARACTERISTICS OF SEEPAGE SAMPLES COLLECTED FROM LAKE YALE

SITE	NUMBER OF SAMPLES	PARAMETER					
		pH (s.u.)	Alkalinity (mg/l)	Conductivity (μmho/cm)	Total N (μg/l)	Total P (μg/l)	Color (Pt-Co)
SP-1	9	7.67	181	513	2,516	38	39
SP-2	6	7.82	141	460	2,113	33	30
SP-3	6	7.90	130	457	1,646	27	24
SP-4	8	7.47	215	591	2,691	42	84
SP-5	7	7.71	154	479	2,272	28	24
SP-6	7	7.91	138	451	1,959	30	27
SP-7	5	7.90	167	450	2,755	36	35
SP-8	8	7.82	138	427	2,234	37	26
SP-9	7	7.86	156	467	2,757	29	22
SP-10	6	7.86	180	487	3,613	33	33
SP-11	5	7.85	152	469	1,929	28	22
SP-12	8	7.86	181	524	3,603	178	25
SP-13	5	7.50	105	419	1,516	63	25
SP-14	3	7.73	146	468	3,054	74	23
SP-15	5	7.78	159	543	3,322	39	20
SP-16	4	7.45	161	538	4,482	36	28
SP-17	3	7.43	162	500	3,259	63	24
Total:	**102**						

In general, groundwater seepage collected from Lake Yale was found to be slightly alkaline in pH, with mean pH values at the individual seepage monitoring sites ranging from approximately 7.43-7.91, reflecting a relatively low degree of variability in values throughout the lake. Relatively similar alkalinity values were also measured in the seepage samples, with overall mean values ranging from 105-215 mg/l, reflecting extremely well buffered conditions at each site. Alkalinity values in this range are sometimes indicative of upwelling of groundwater from deeper aquifers. Measured conductivity values in the collected seepage samples were also relatively uniform in value, with overall geometric mean concentrations ranging from 419-591 μmho/cm, reflecting values typical of conductivity measurements commonly observed in seepage samples collected from Central Florida lakes.

Mean concentrations of total nitrogen in groundwater seepage were also relatively similar between the individual monitoring sites, with overall geometric mean values ranging from 1,516-4,482 μg/l. Overall, the measured seepage nitrogen values appear to be similar to seepage concentrations observed in other Central Florida lakes.

Measured concentrations of total phosphorus in seepage samples entering Lake Yale were extremely low in value, with overall geometric mean values at 16 of the 17 sites ranging from 28-74 μg/l, reflecting low values compared with phosphorus concentrations commonly observed in Central Florida lakes. A somewhat more elevated geometric mean value of 178 μg/l was observed at Site 12 which is located on the south side of Lake Yale adjacent to agricultural areas. Seepage inputs of total phosphorus entering Lake Yale appear to be relatively low compared with values observed in other eutrophic lakes.

Measured color values in seepage samples collected from Lake Yale were moderate in value, with geometric mean concentrations ranging from 20-84 Pt-Co units, and the vast majority of measurements less than 40 Pt-Co units.

Isopleths of mean pH values in groundwater seepage entering Lake Yale from June 2015-October 2016 are illustrated on Figure 5-21. The most elevated seepage pH values were observed in perimeter portions of Lake Yale, with lower pH values observed in central and southeastern portions of the lake. However, a relatively low degree of variability was observed in seepage pH values throughout the lake.

Isopleths of mean alkalinity concentrations in groundwater seepage entering Lake Yale from June 2015-October 2016 are illustrated on Figure 5-22. Alkalinity values appear to be relatively consistent throughout much of Lake Yale, with the majority of areas within the lake exhibiting alkalinity values ranging from 130-170 mg/l. Slightly more elevated alkalinity values were observed in the wetland cove on the east side of Lake Yale, with slightly lower than average values observed in the extreme southeast portion of the lake.

Isopleths of mean conductivity values in groundwater seepage entering Lake Yale from June 2015-October 2016 are illustrated on Figure 5-23. Seepage conductivity values less than approximately 500 μmho/cm were observed in western and southeastern portions of the lake, with conductivity values equal to or greater than 500 μmho/cm observed in central portions of the lake and in the wetland pocket on the east side of the lake.

Isopleths of mean total nitrogen values in groundwater seepage entering Lake Yale from June 2015-October 2016 are illustrated on Figure 5-24. Seepage nitrogen concentrations of approximately 3,000 μg/l or less were observed in most of the western and southeastern portions of the lake, with more elevated values observed in the central area. The overall pattern for the total nitrogen isopleths illustrated on Figure 5-24 appear to be similar to the isopleths previously discussed for conductivity.

Isopleths of mean total phosphorus values in groundwater seepage entering Lake Yale from June 2015-October 2016 are illustrated on Figure 5-25. Isopleth contour lines of total phosphorus in seepage are equal to approximately 60 μg/l or less in virtually all areas of Lake Yale, with the exception of more elevated phosphorus values observed at seepage monitoring Site 12 located on the south side of Lake Yale adjacent to an agricultural watershed.

Isopleths of mean color values in groundwater seepage entering Lake Yale from June 2015-October 2016 are illustrated on Figure 5-26. Relatively low color values, generally less than 30 Pt-Co units, were observed in virtually all portions of Lake Yale, with the exception of the isolated wetland pocket area located on the east side of the lake. Evidence of high color water discharging from this area into the main portion of Lake Yale can be seen in aerial photographs of the lake.

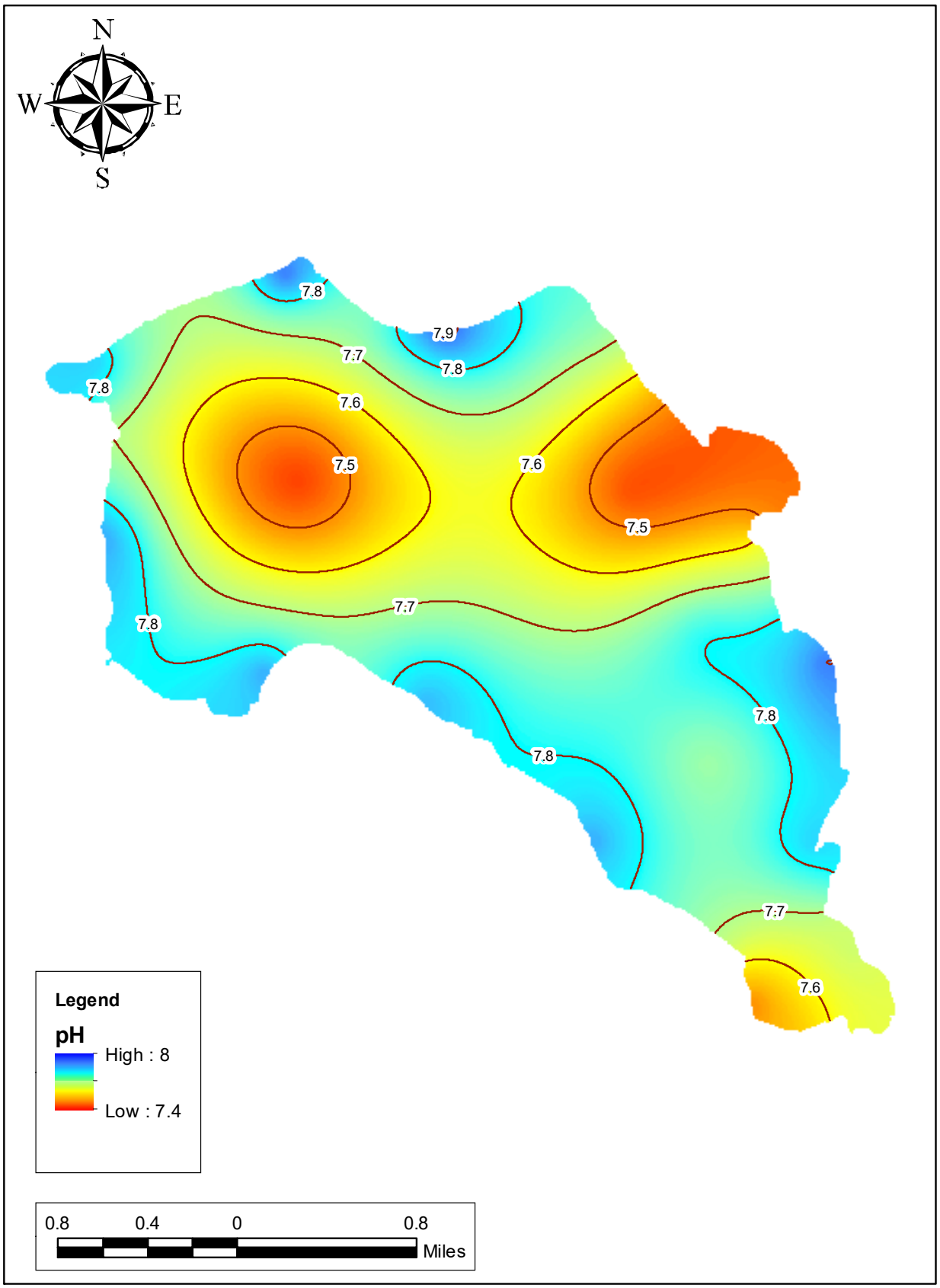


Figure 5-21. Isopleths of Mean pH Values (s.u.) in Seepage Samples Collected in Lake Yale from June 2015-October 2016.

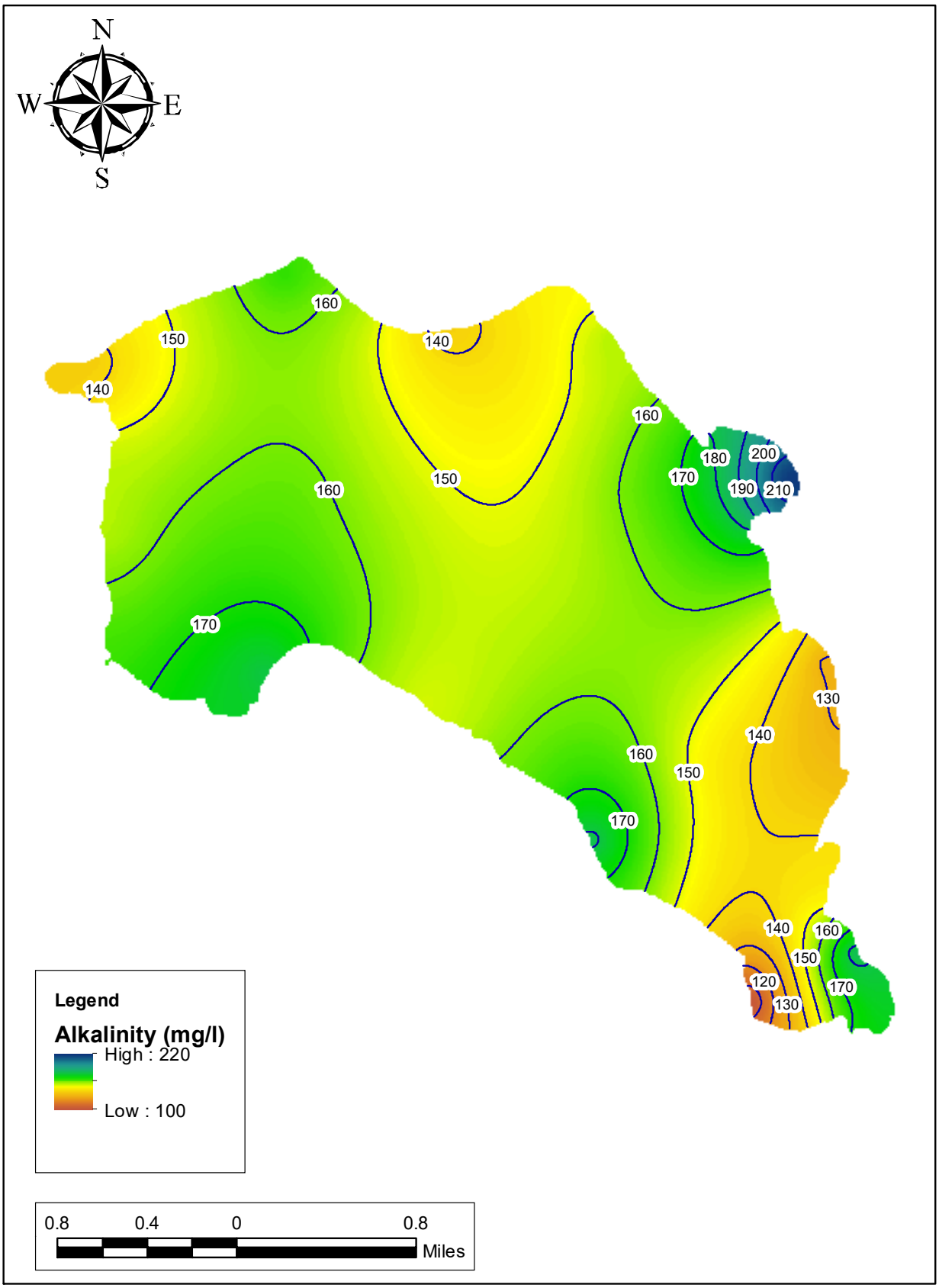


Figure 5-22. Isopleths of Mean Alkalinity Values (mg/l) in Seepage Samples Collected in Lake Yale from June 2015-October 2016.

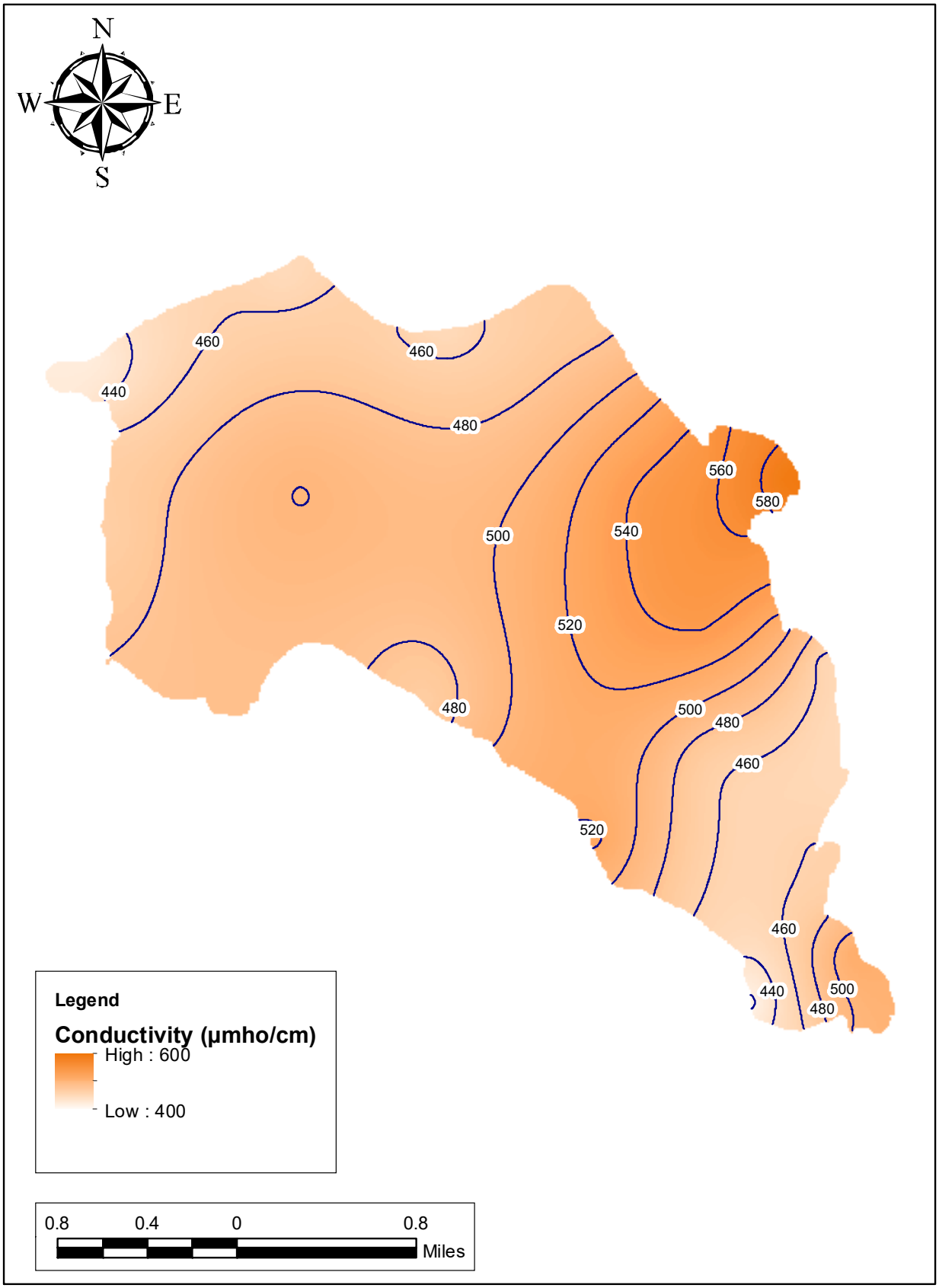


Figure 5-23. Isopleths of Mean Conductivity Values (µmho/cm) in Seepage Samples Collected in Lake Yale from June 2015-October 2016.

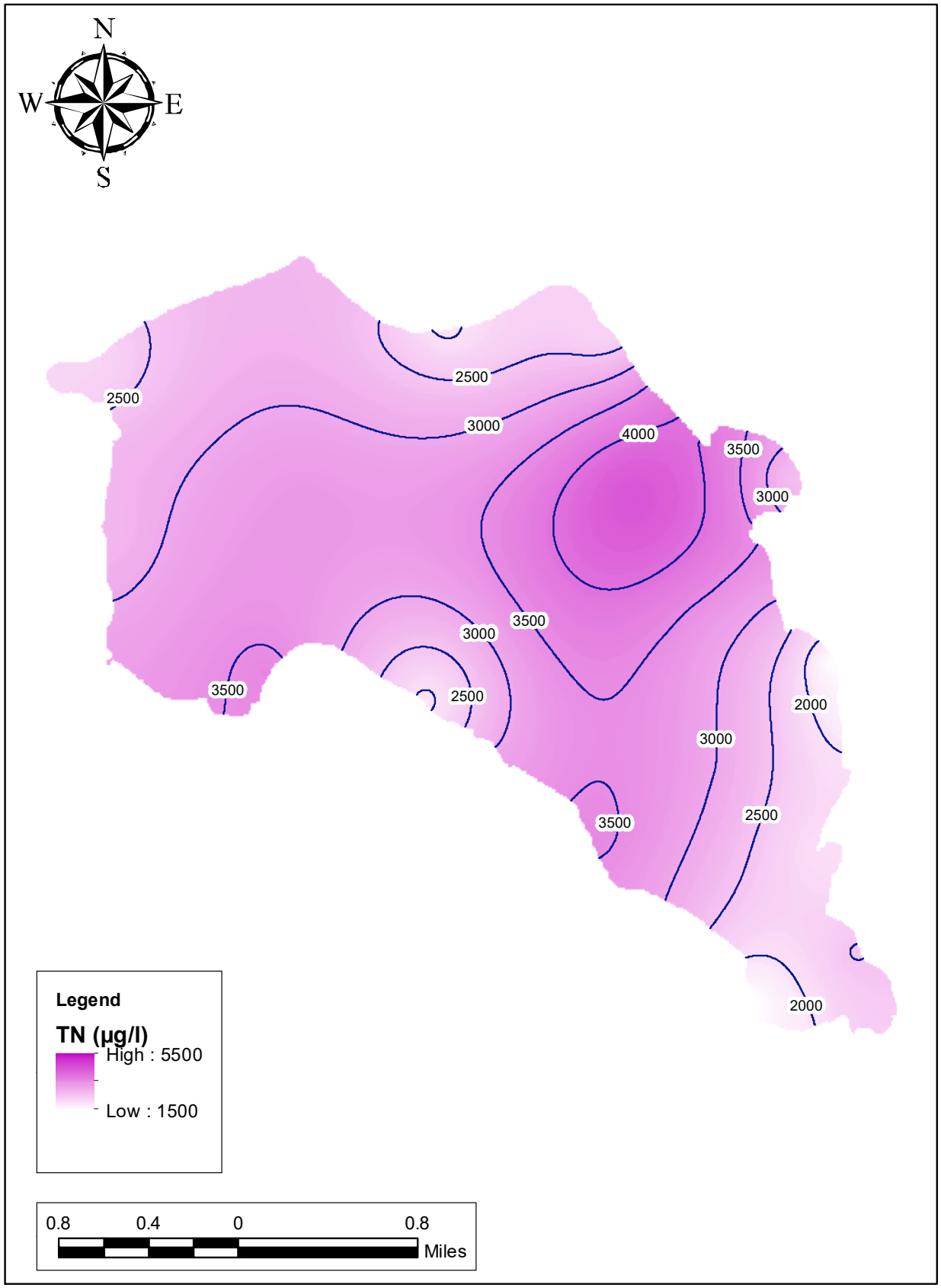


Figure 5-24. Isopleths of Mean Total Nitrogen Concentrations (µg/l) in Seepage Samples Collected in Lake Yale from June 2015-October 2016.

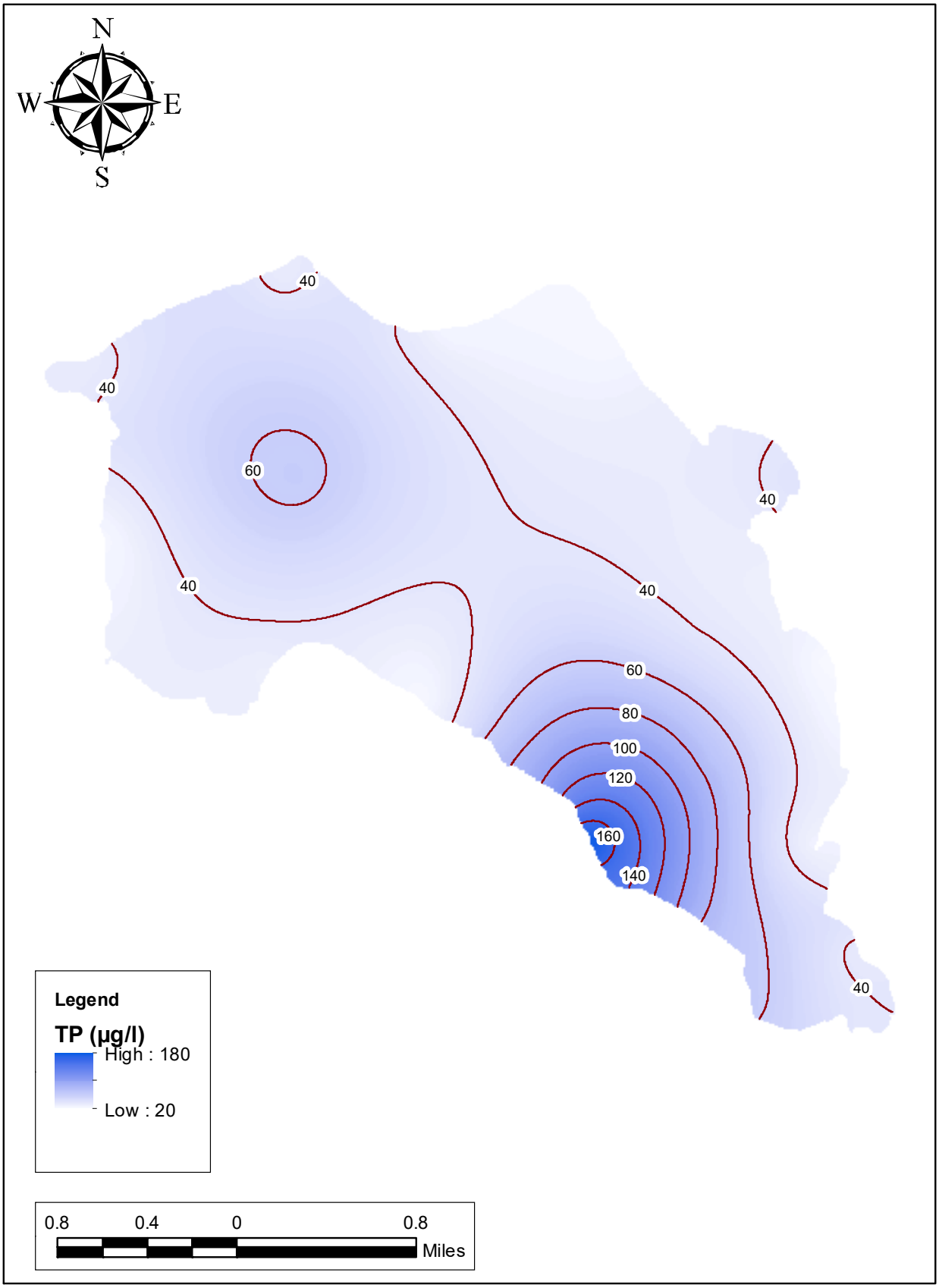


Figure 5-25. Isopleths of Mean Total Phosphorus Concentrations (µg/l) in Seepage Samples Collected in Lake Yale from June 2015-October 2016.

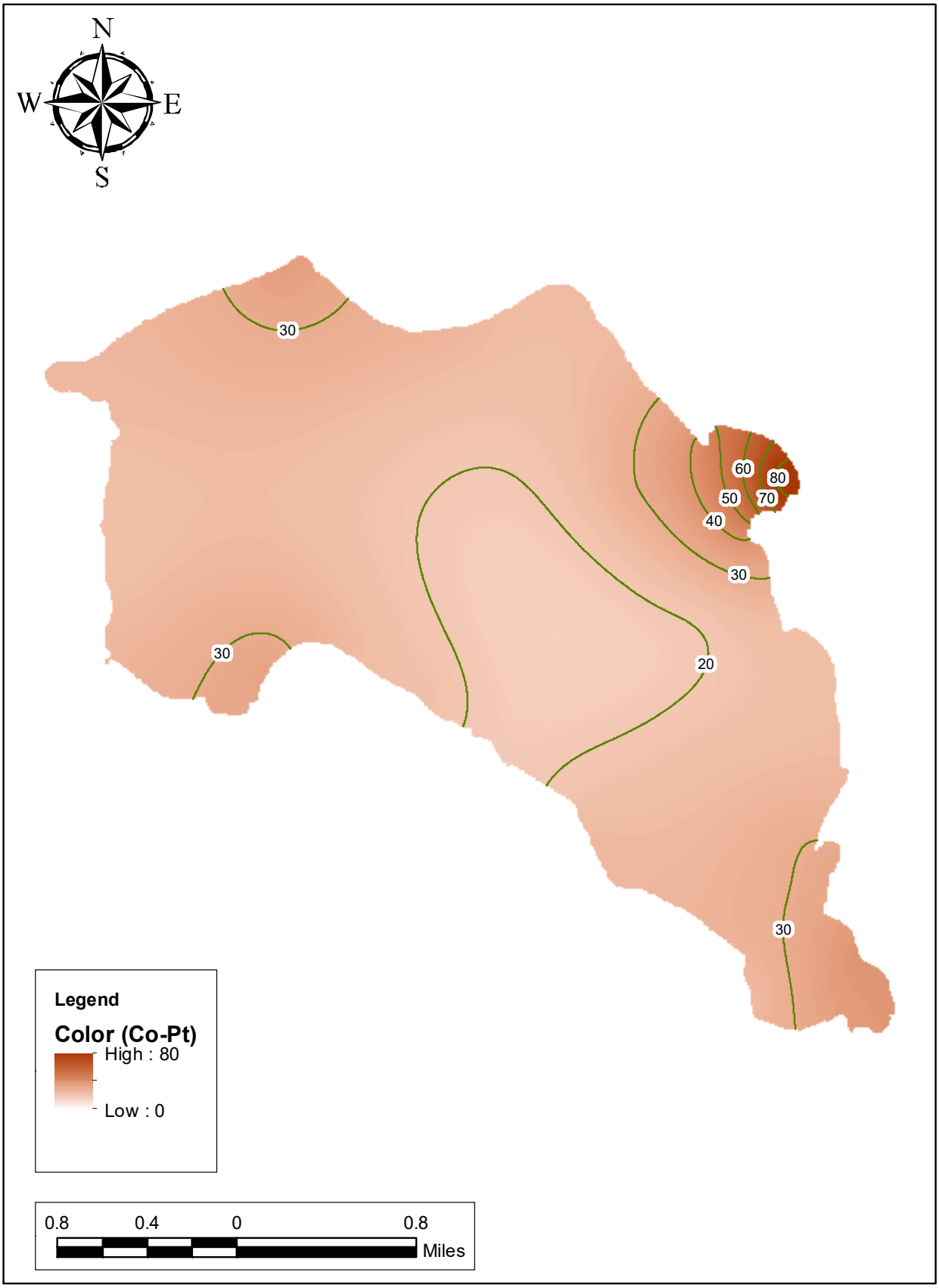


Figure 5-26. Isopleths of Mean Color Values (Pt-Co) in Seepage Samples Collected in Lake Yale from June 2015-October 2016.

5.1.3.1.2 Trout Lake

A tabular summary of mean characteristics of seepage samples collected in Trout Lake from May 2015-October 2016 is given on Table 5-12. The mean values listed in Table 5-12 reflect log-normal or geometric mean values since the data exhibit a log-normal distribution.

TABLE 5-12

GEOMETRIC MEAN CHARACTERISTICS OF SEEPAGE SAMPLES COLLECTED FROM TROUT LAKE

SITE	NUMBER OF SAMPLES	PARAMETER					
		pH (s.u.)	Alkalinity (mg/l)	Conductivity (μmho/cm)	Total N (μg/l)	Total P (μg/l)	Color (Pt-Co)
SP-1	9	7.05	55.0	225	3,007	236	159
SP-2	9	7.00	46.3	228	2,548	348	187
SP-3	8	7.13	62.7	277	3,755	461	171
SP-4	8	6.97	61.5	233	1,394	425	130
SP-5	9	6.97	61.5	233	1,394	425	130
SP-6	8	7.15	81.0	290	7,070	1,110	148
Total:	**51**						

In general, seepage samples collected from Trout Lake were found to be approximately neutral in value, with mean pH values at the individual sites ranging from 6.97-7.15. Seepage samples from Trout Lake were also moderately to poorly buffered, with mean alkalinity values ranging from 46.3-81.0 mg/l. The most elevated alkalinity measurements occurred at monitoring Site 6, located in central portions of Trout Lake adjacent to the large wetland area, with an overall mean alkalinity of 81.0 mg/l.

Moderate levels of conductivity were observed in groundwater seepage entering Trout Lake, with overall geometric mean values at Sites 1-5 ranging from 225-277 μmho/cm. A somewhat more elevated geometric mean value of 290 μmho/cm was observed at Site 6. The observed conductivity values in Trout Lake are approximately half of the values measured in Lake Yale.

A relatively high degree of variability was observed in measured concentrations of total nitrogen in groundwater samples collected from Trout Lake. Geometric mean total nitrogen concentrations at Sites 1-5 ranged from 1,394-3,755 μg/l, with a substantially more elevated total nitrogen concentration of 7,070 μg/l observed at monitoring Site 6. With the exception of Site 6, the observed nitrogen concentration in Trout Lake seepage are similar to the concentrations measured in Lake Yale.

A similar pattern was also observed for measured total phosphorus concentrations, with mean values at Sites 1-5 ranging from 236-461 mg/l and a substantially more elevated value of 1,110 μg/l observed at Site 6. In contrast to the trend observed for nutrients, measured color values were relatively uniform throughout the lake, with mean values ranging from 130-187 Pt-Co units.

Isopleths of mean pH values in groundwater seepage entering Trout Lake from May 2015-October 2016 are illustrated on Figure 5-27. Seepage pH values were relatively similar throughout Trout Lake, with eastern and western portions of the lake characterized by pH values of approximately 7.0 or less and middle portions of the lake characterized by pH values ranging from 7.0-7.1.

Isopleths of mean alkalinity values in groundwater seepage entering Trout Lake from May 2015-October 2016 are illustrated on Figure 5-28. The lowest measured alkalinity values were observed in the southeastern and western portions of the lake, with more elevated alkalinity observed in central portions of Trout Lake. Elevated alkalinity is often associated with groundwater inputs from deeper limestone formations, and the isopleths on Figure 5-28 suggest that these deeper sources may be impacting seepage characteristics in central portions of the lake.

Isopleths of mean conductivity values in groundwater seepage entering Trout Lake from May 2015-October 2016 are illustrated on Figure 5-29. Seepage conductivity values of approximately 250 μmho/cm or less were observed on the western and southeastern portions of Trout Lake, with conductivity values in excess of 250 μmho/cm observed in central portions of the lake.

Isopleths of mean total nitrogen concentrations in groundwater seepage entering Trout Lake from May 2015-October 2016 are illustrated on Figure 5-30. In general, the isopleths for concentrations for total nitrogen are similar to the isopleths observed for conductivity and alkalinity, with the lowest observed values on the west and southeast portions of the lake, and the most elevated total nitrogen values observed in central portions of Trout Lake, adjacent to the inflow from the large wetland area.

Isopleths of mean total phosphorus concentrations in groundwater seepage entering Trout Lake from May 2015-October 2016 are illustrated on Figure 5-31. The lowest concentrations of total phosphorus appear to occur in western and southeastern portions of Trout Lake, with more elevated values observed in central portions of the lake. Measured total phosphorus concentrations in groundwater seepage entering Trout Lake are approximately one order of magnitude higher in value than phosphorus concentrations observed entering Lake Yale.

Isopleths of mean color values in groundwater seepage entering Trout Lake from May 2015-October 2016 are illustrated on Figure 5-32. The lowest color values in seepage were observed in northern and western portions of the lake, with more elevated color values observed in eastern and southeastern portions of the lake. Overall, measured color values in groundwater seepage entering Trout Lake are approximately 3-6 times greater than color values measured in seepage entering Lake Yale.

5.1.3.2 Mass Loadings

Mean seepage isopleths for influx of total nitrogen and total phosphorus were generated by combining the concentration isopleths for total nitrogen and total phosphorus in Lake Yale and Trout Lake with the hydrologic isopleths for groundwater seepage for the two lakes summarized in Figures 4-11 for Lake Yale and 4-12 for Trout Lake. This procedure results in estimates of nutrient flux in terms of mass of nitrogen or phosphorus per square meter of lake surface per day. A summary of measured nutrient influx to Lake Yale and Trout Lake from groundwater seepage is given in the following sections.

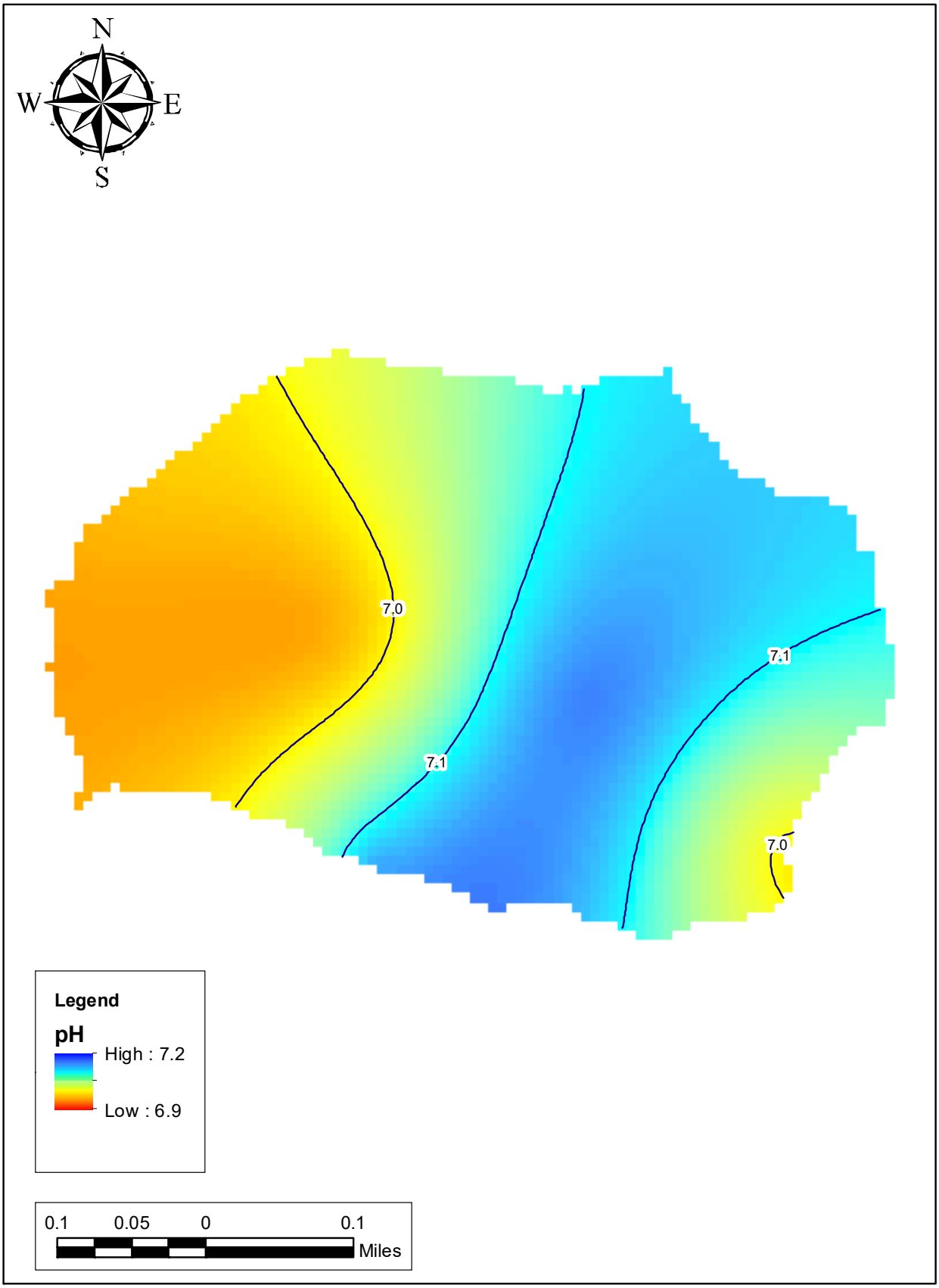


Figure 5-27. Isopleths of Mean pH Values (s.u.) in Seepage Samples Collected in Trout Lake from May 2015-October 2016.

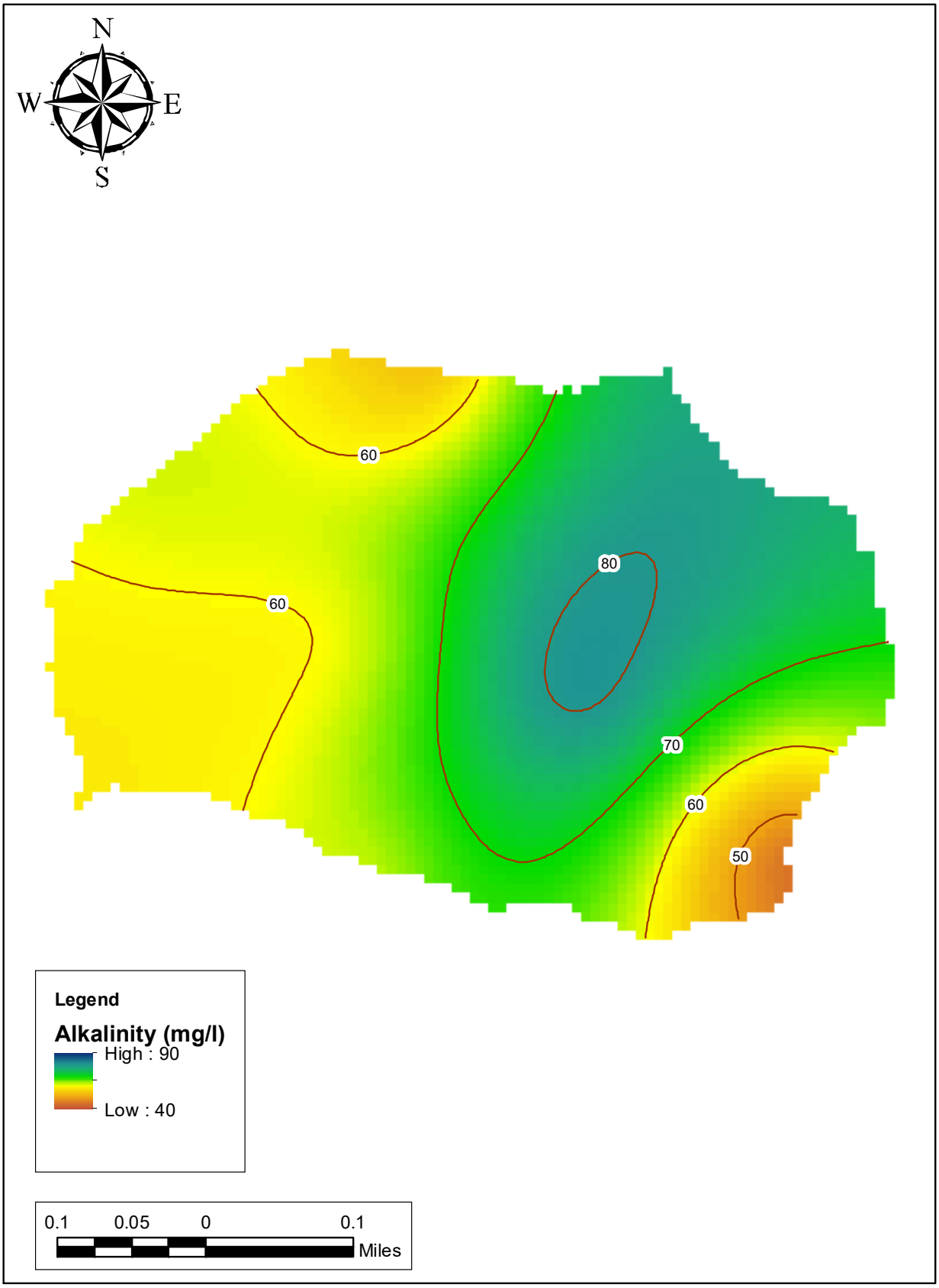


Figure 5-28. Isopleths of Mean Alkalinity Values (mg/l) in Seepage Samples Collected in Trout Lake from May 2015-October 2016.

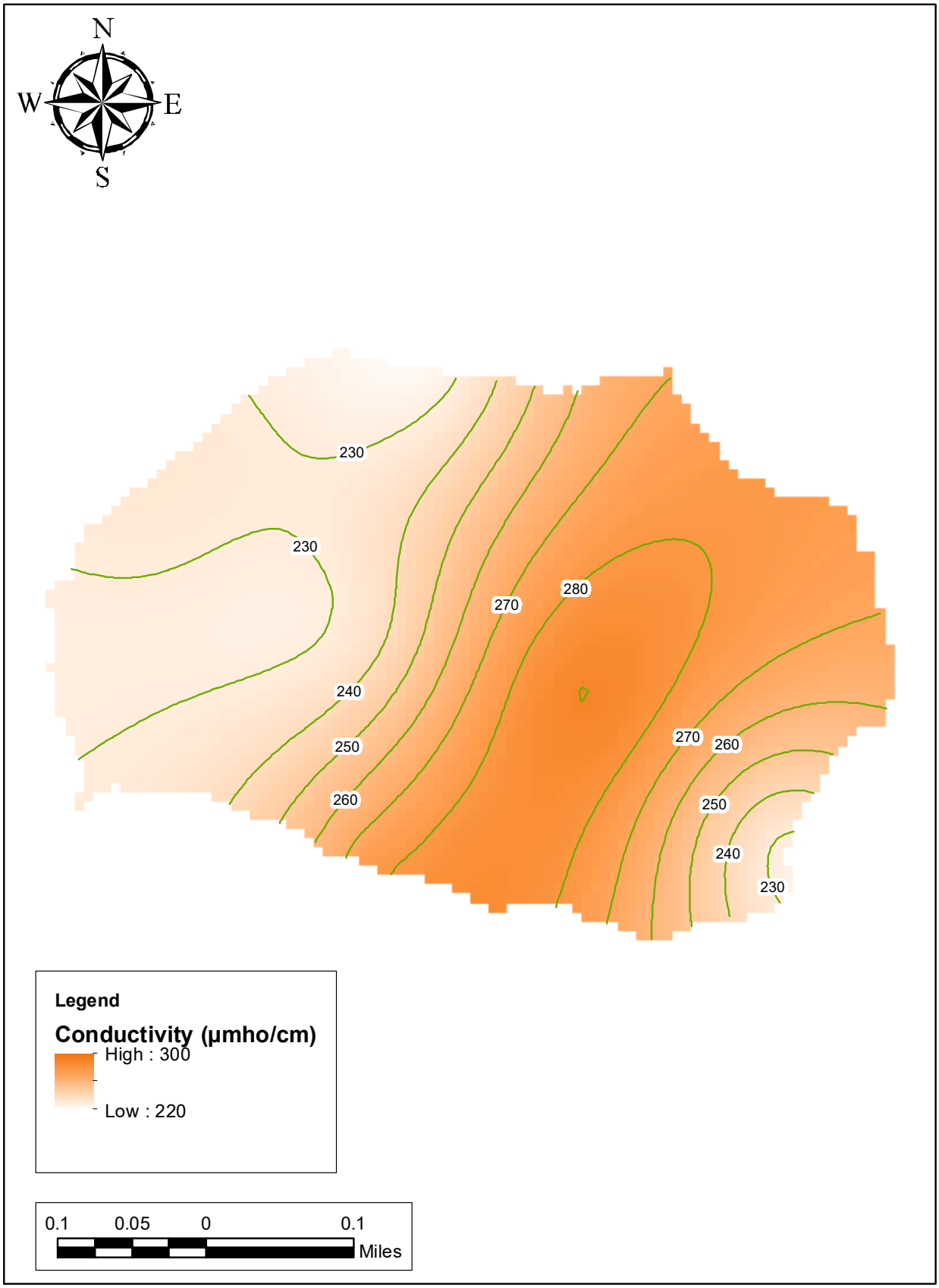


Figure 5-29. Isopleths of Mean Conductivity Values (µmho/cm) in Seepage Samples Collected in Trout Lake from May 2015-October 2016.

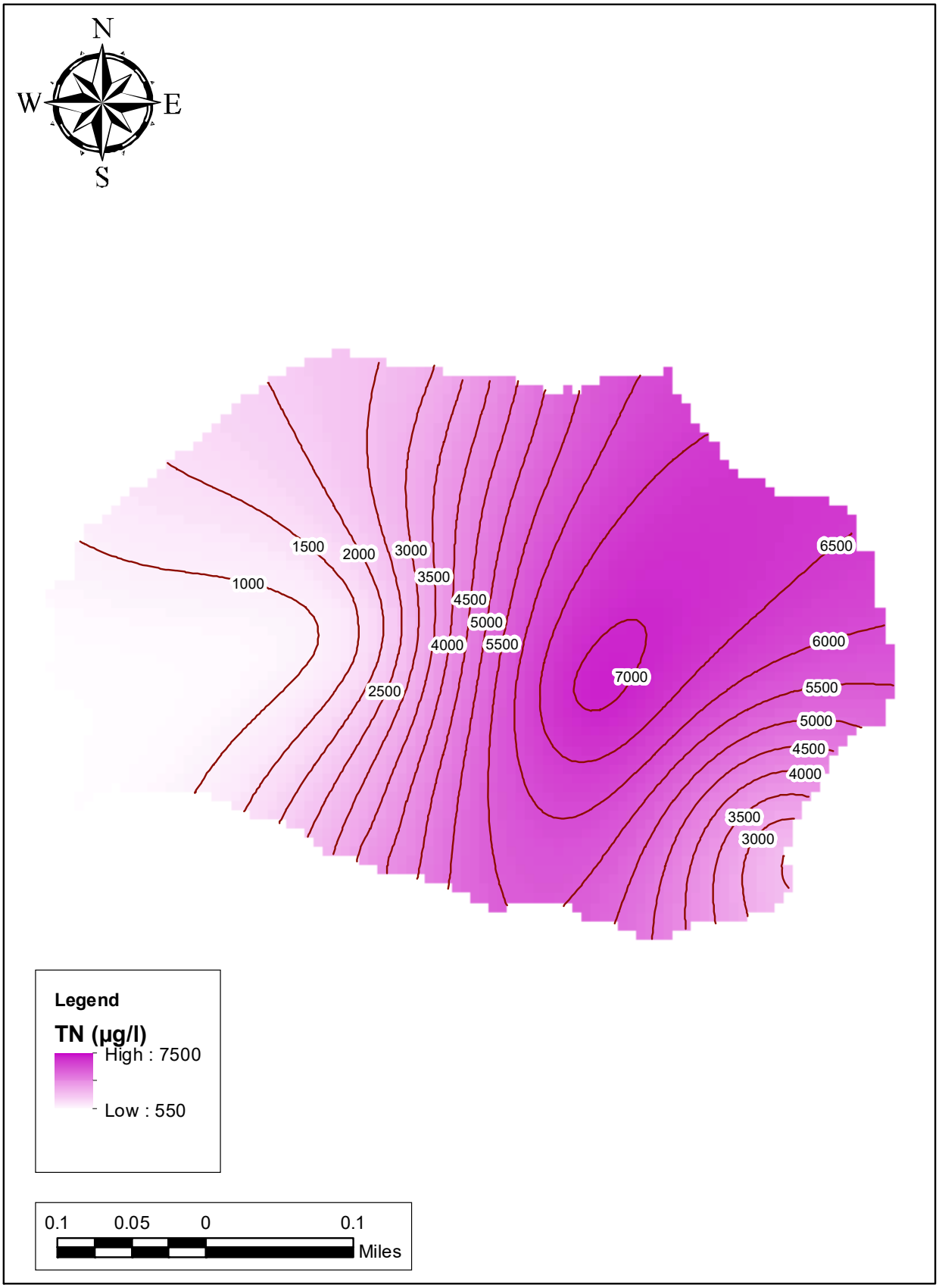


Figure 5-30. Isopleths of Mean Total Nitrogen Concentrations (µg/l) in Seepage Samples Collected in Trout Lake from May 2015-October 2016.

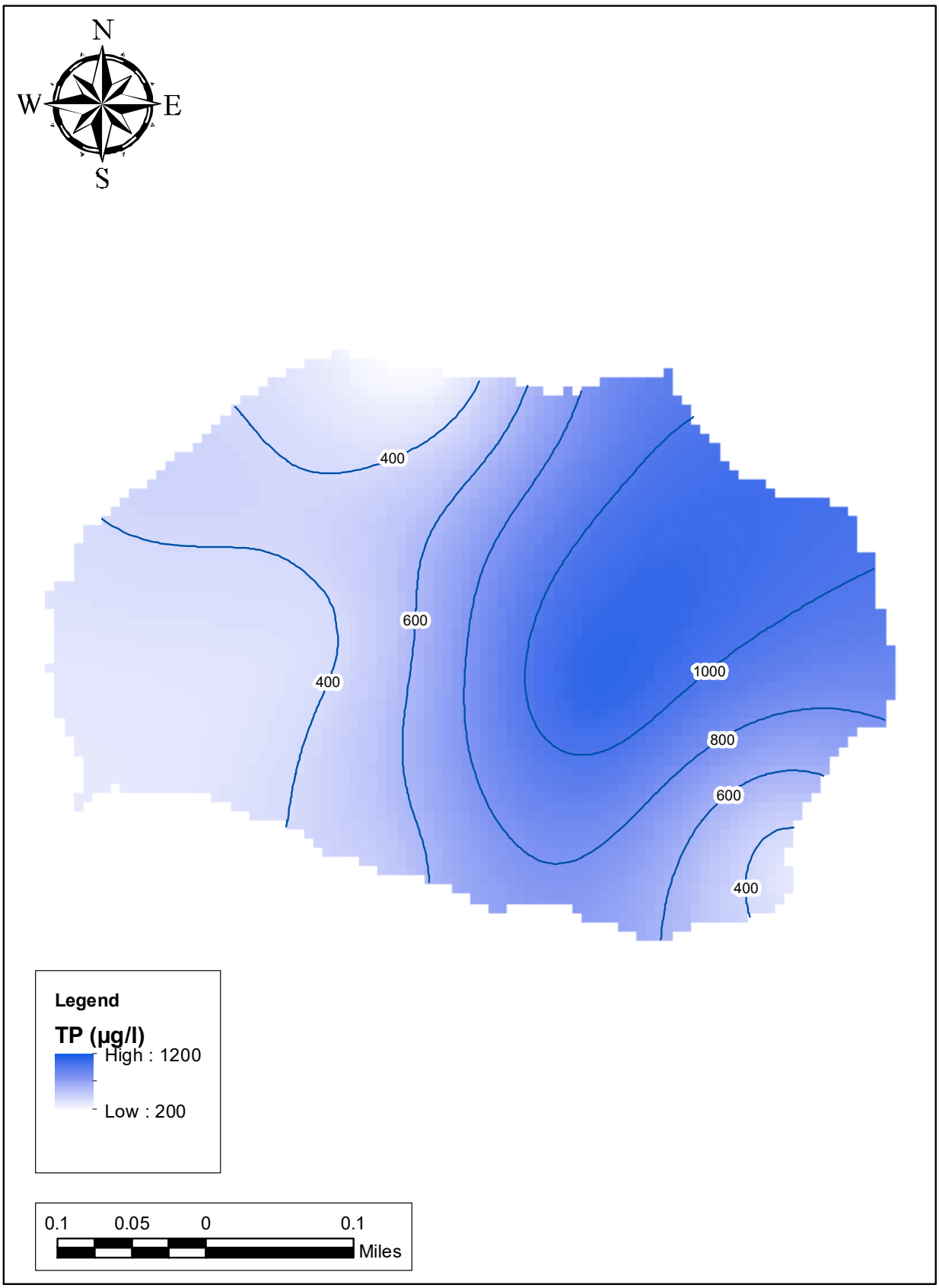


Figure 5-31. Isopleths of Mean Total Phosphorus Concentrations (µg/l) in Seepage Samples Collected in Trout Lake from May 2015-October 2016.

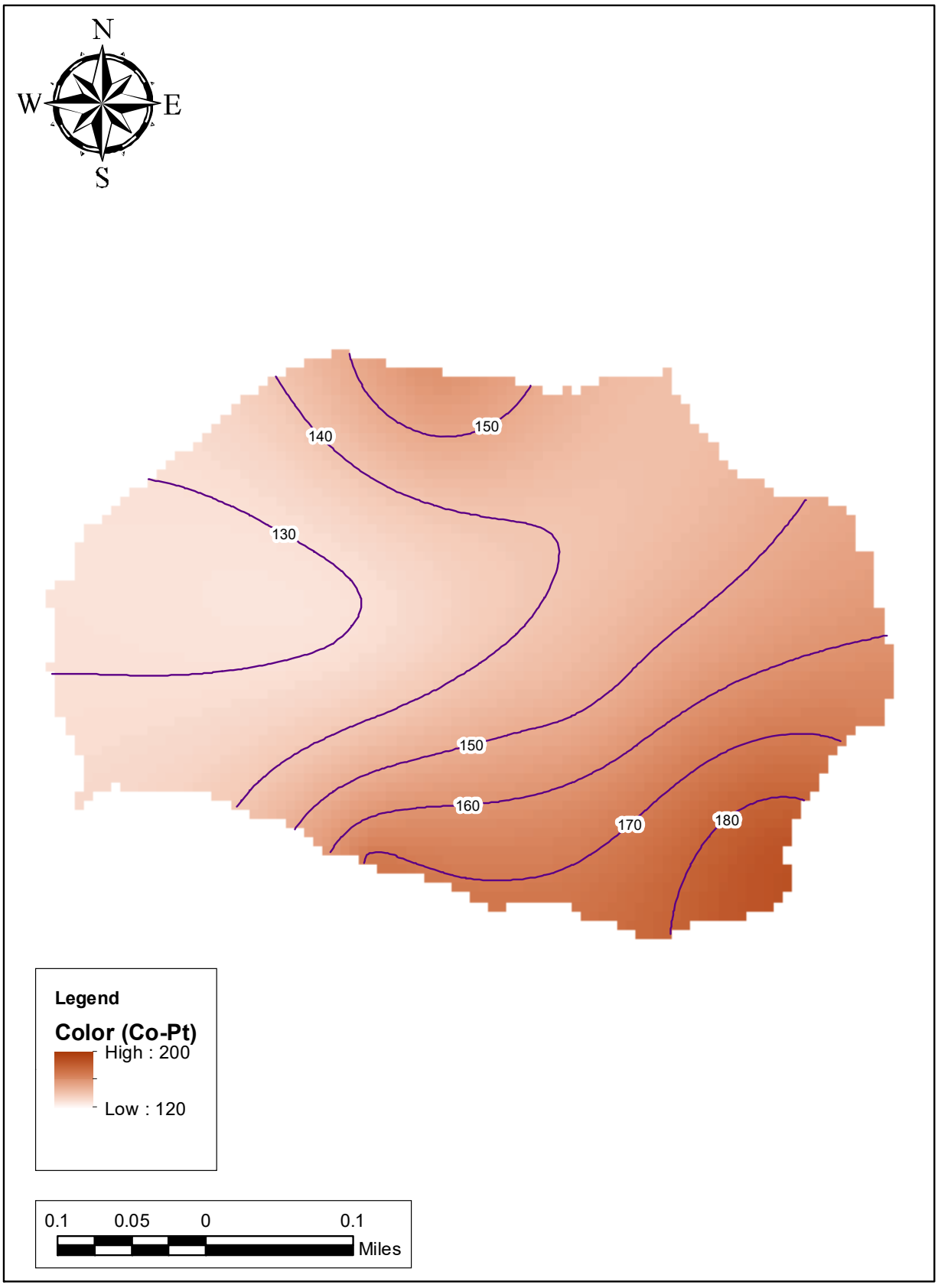


Figure 5-32. Isopleths of Mean Color Values (Pt-Co) in Seepage Samples Collected in Trout Lake from May 2015-October 2016.

5.1.3.2.1 Lake Yale

Isopleths of mean seepage influx of total nitrogen into Lake Yale during the field monitoring program are illustrated on Figure 5-33. In general, nitrogen influx from groundwater seepage ranges from approximately 1,500-3,500 $\mu g/m^2$-day. The most elevated levels of nitrogen influx were observed in isolated pockets along the south shore of the lake where isopleth contours exceeded 3,000-3,500 $\mu g/m^2$-day. Substantially lower nitrogen influx rates from seepage were observed along the northern, eastern, and southeastern portions of the lake.

Isopleths of mean seepage influx of total phosphorus into Lake Yale during the field monitoring program are illustrated on Figure 5-34. Seepage phosphorus influx in the majority of Lake Yale ranges from approximately 20-60 $\mu g/m^2$-day, with higher mass influx values (ranging from 60-140 $\mu g/m^2$-day) just west of the southeast lobe of the lake. This area of elevated influx is in the vicinity of seepage monitoring Site 12 which is located adjacent to an agricultural watershed.

The mass flux isopleths for total nitrogen and total phosphorus (presented on Figures 5-33 and 5-34) were integrated to develop estimates of the total influx of nitrogen and phosphorus from groundwater seepage into Lake Yale. A summary of estimated annual mass loadings of total nitrogen and total phosphorus to Lake Yale from groundwater seepage is given in Table 5-13. Overall, groundwater seepage contributes an influx of approximately 732 $\mu g/m^2$-day of total nitrogen to Lake Yale, with an influx of 25.1 $\mu g/m^2$-day for total phosphorus. On an overall average annual basis, groundwater seepage contributes approximately 4,341 kg/yr of total nitrogen and 149 kg/yr of total phosphorus to Lake Yale.

TABLE 5-13

ESTIMATED ANNUAL MASS LOADINGS TO LAKE YALE FROM GROUNDWATER SEEPAGE

TOTAL NITROGEN			TOTAL PHOSPHORUS			AREAL LOADING (kg/ac-yr)	
$\mu g/m^2$-day	g/day	kg/yr	$\mu g/m^2$-day	g/day	kg/yr	Total N	Total P
732	11,892	4,341	25.1	408	149	1.08	0.037

Calculated areal loadings of groundwater seepage are provided in the final columns of Table 5-13 which reflects the mass influx divided by the lake surface area. These values provide a way of comparing seepage loadings between lakes without consideration of lake size. The mean areal seepage loadings of 1.08 kg/ac-yr for total nitrogen and 0.037 kg/ac-yr for total phosphorus are somewhat lower than areal mass loading rates for groundwater seepage commonly observed by ERD in Central Florida lakes. The relatively low areal loading rates are primarily due to the low nutrient concentrations observed in seepage samples collected from Lake Yale.

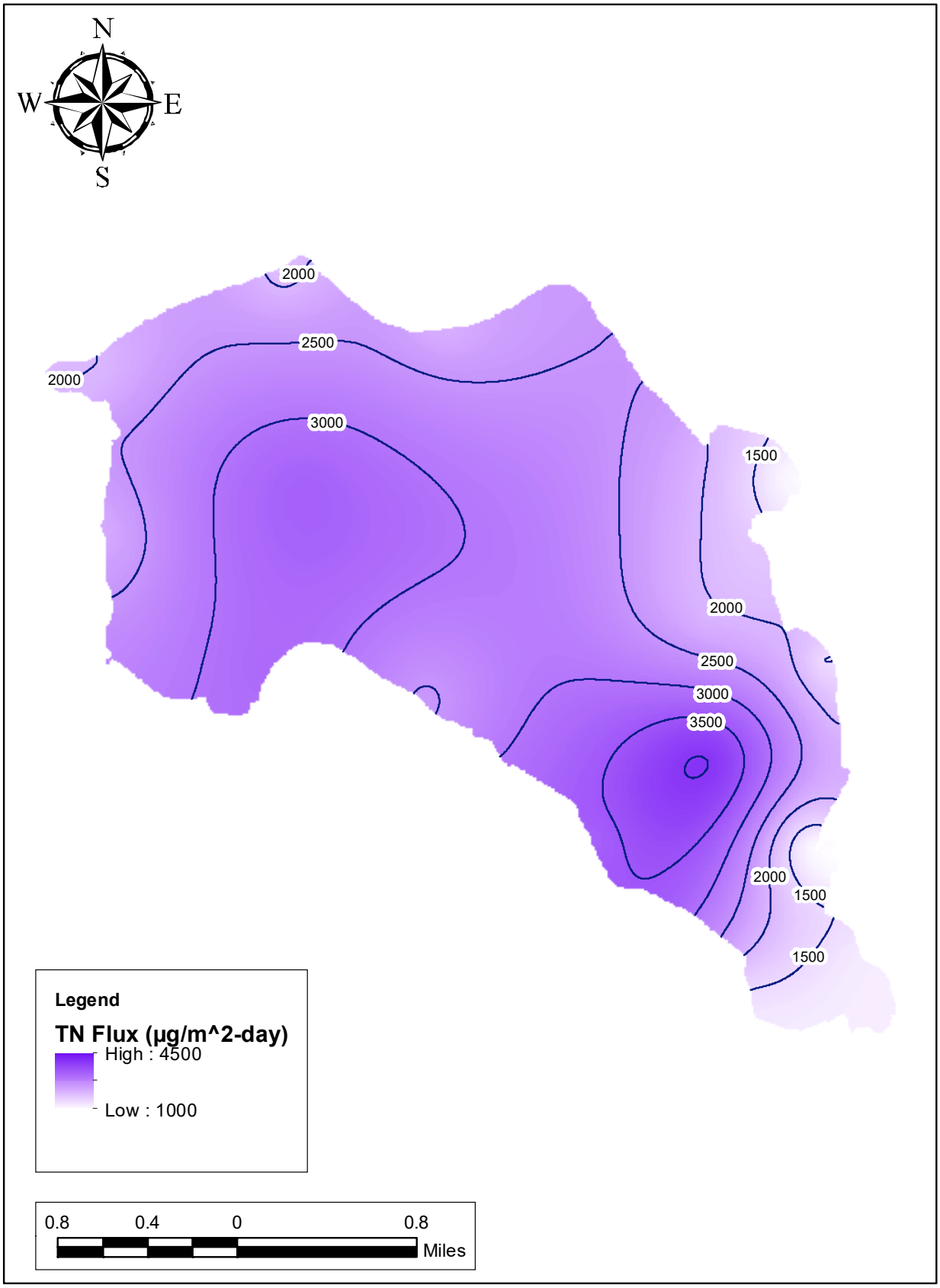


Figure 5-33. Isopleths of Total Nitrogen Influx (µg/m^2-day) from Groundwater Seepage Entering Lake Yale.

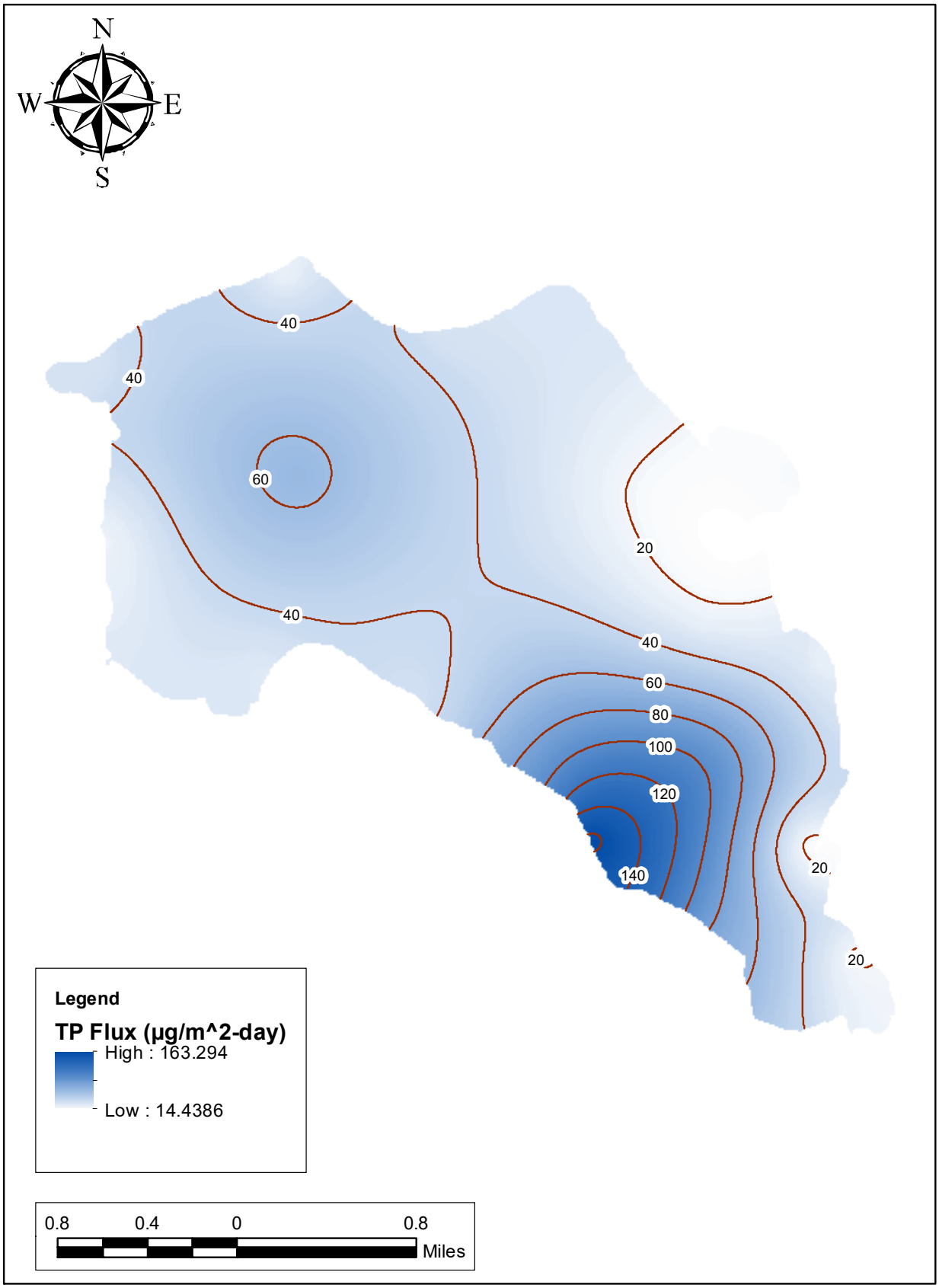


Figure 5-34. Isopleths of Total Phosphorus Influx (µg/m^2-day) from Groundwater Seepage Entering Lake Yale.

5.1.3.2.2 Trout Lake

Isopleths of mean seepage influx of total nitrogen into Trout Lake during the field monitoring program are illustrated on Figure 5-35. In general, nitrogen influx from groundwater seepage ranges from approximately 1,000-8,000 $\mu g/m^2$-day, with the lowest nitrogen influx occurring on the west side of the lake and the highest influx rates occurring on the northeast and east sides of the lake adjacent to the Trout Lake wetland area.

Isopleths of mean seepage influx of total phosphorus into Trout Lake during the field monitoring program are illustrated on Figure 5-36. Phosphorus seepage influx contours range from 300-1,200 $\mu g/m_2$-day, with the lowest influx rates occurring on the west and southeast portions of the lake and the highest influx rates occurring in areas adjacent to the Trout Lake wetland.

The isopleths summarized on Figures 5-35 and 5-36 were integrated to develop estimates of the total influx of nitrogen and phosphorus from groundwater seepage into Trout Lake on an average annual basis. A summary of estimated annual mass loadings of nitrogen and phosphorus to Trout Lake from groundwater seepage is given in Table 5-14. Overall, the mean seepage nitrogen influx rate for Trout Lake is 4,102 $\mu g/m^2$-day, approximately 6 times greater than the nitrogen influx measured in Lake Yale. Phosphorus influx into Trout Lake from groundwater seepage is approximately 691 $\mu g/m^2$-day which is approximately 25 times greater than the measured phosphorus seepage influx of 25.1 $\mu g/m^2$-day measured in Lake Yale. Overall, groundwater seepage is estimated to contribute approximately 644 kg/yr of total nitrogen and 109 kg/yr of total phosphorus to Trout Lake.

TABLE 5-14

ESTIMATED ANNUAL MASS LOADINGS TO TROUT LAKE FROM GROUNDWATER SEEPAGE

TOTAL NITROGEN			TOTAL PHOSPHORUS			AREAL LOADING (kg/ac-yr)	
$\mu g/m^2$-day	g/day	kg/yr	$\mu g/m^2$-day	g/day	kg/yr	Total N	Total P
4,102	1,764	644	691	297	109	6.08	1.03

Calculated areal loadings of groundwater seepage are provided in the final columns of Table 5-14 which reflect the mass influx divided by the lake surface area. The mean nitrogen loading rate to Trout Lake is 6.08 kg/ac-yr, approximately 6 times greater than the nitrogen influx rate measured in Lake Yale. The areal phosphorus loading from groundwater seepage entering Trout Lake is 1.03 kg/ac-yr, approximately 28 times greater than the phosphorus influx rate measured entering Lake Yale. Overall, groundwater seepage appears to be a more significant source of nutrient loading to Trout Lake than in Lake Yale. The observed areal loading rates of 6.08 kg/ac-yr for total nitrogen and 1.03 kg/ac-yr for total phosphorus are substantially greater than seepage nutrient influx rates commonly observed by ERD in other Central Florida lakes.

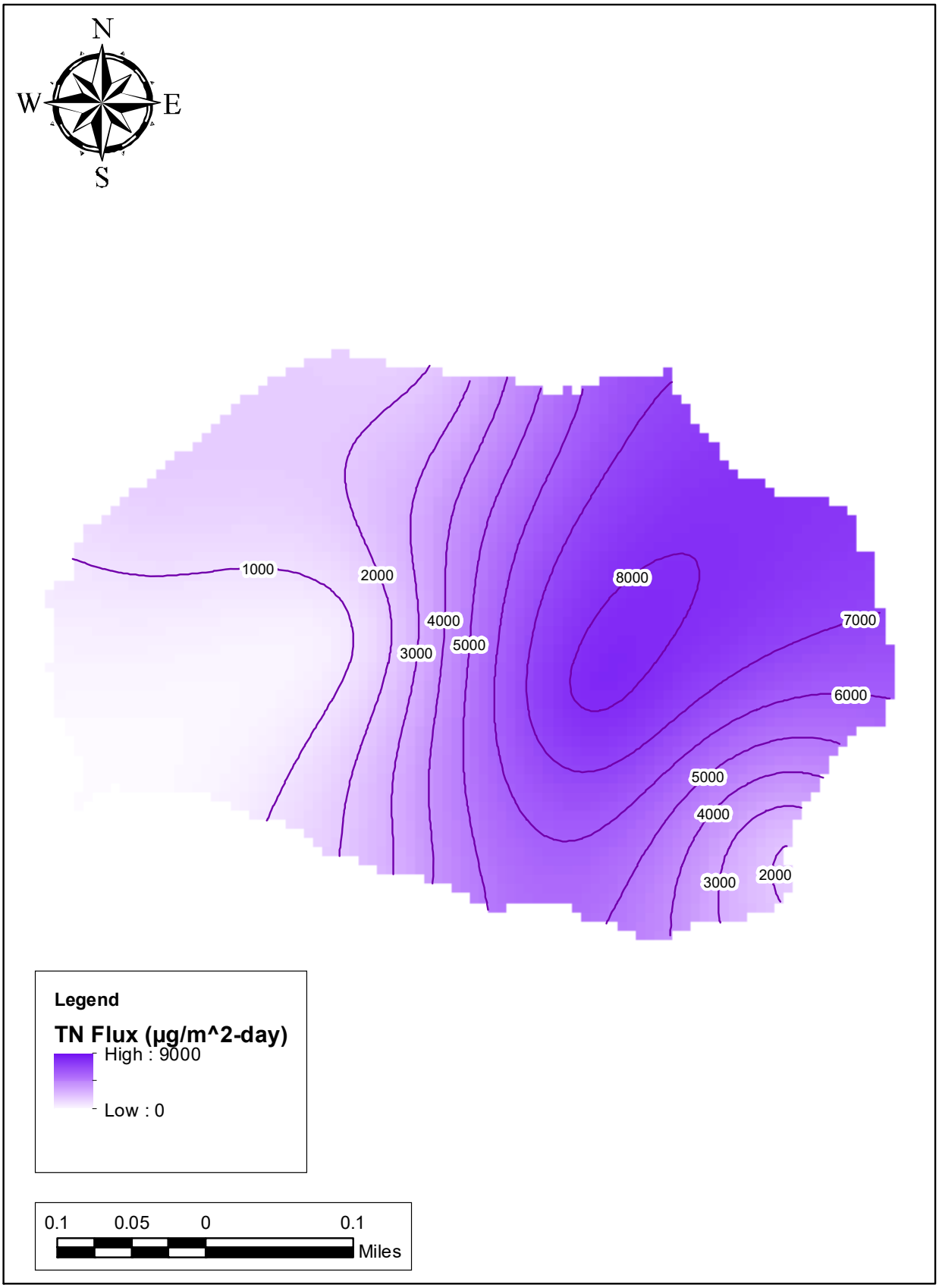


Figure 5-35. Isopleths of Total Nitrogen Influx (µg/m^2-day) from Groundwater Seepage Entering Trout Lake.

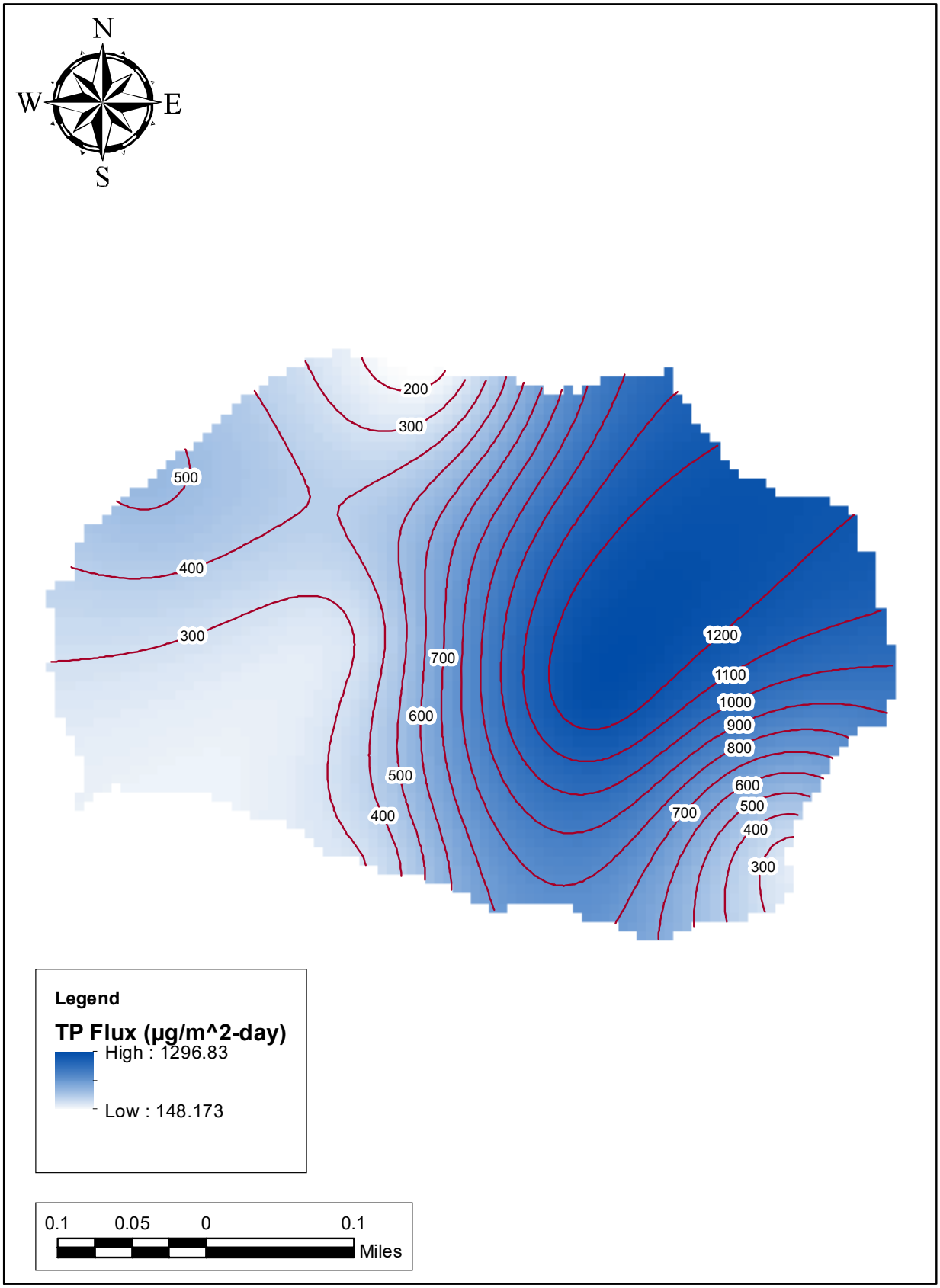


Figure 5-36. Isopleths of Total Phosphorus Influx (µg/m^2-day) from Groundwater Seepage Entering Trout Lake.

5.1.4 Internal Recycling

Quantification of sediment phosphorus release as a result of internal recycling in lakes is difficult, and a variety of methods have been used by researchers to estimate this loading. One method which has been used in reservoirs is called the Mass Balance Method. This method is best suited to a waterbody with well defined inputs and outputs. A mass balance is then conducted on the waterbody over a one- to two-week period. An increase of phosphorus mass within the lake, after accounting for inputs and losses, would suggest that a net internal loading has occurred. However, this method appears inappropriate for use in Lake Yale and Trout Lake since the lakes are impacted by a wide variety of hydrologic and pollutant sources.

A method which has been used extensively in deep northern lakes is to measure changes in phosphorus content in the hypolimnion of a stratified lake over an extended period of anoxia. The increase in phosphorus mass within the stratified hypolimnion can then be directly correlated with sediment release rates. However, this method also appears inappropriate for use in Lake Yale and Trout Lake since the lakes are relatively shallow, and although a well defined hypolimnion may develop, circulation events are relatively common.

A third method of quantifying the internal loadings is through trophic state modeling. Using this approach, hydrologic and nutrient inputs are estimated from all quantifiable sources. A trophic state model is then developed to predict water column concentrations of total phosphorus. If the model underestimates phosphorus concentrations, then a missing phosphorus load may be present which can be attributed to internal recycling. However, this methodology can be highly inaccurate and is dependent upon the accuracy of the estimated loadings for other variables.

The final method used for quantification of internal loadings is to perform sediment release experiments. In this method, large diameter sediment cores are collected from various locations within the lake and incubated in the laboratory under a variety of conditions to simulate variability in the lake throughout the year. Changes in phosphorus concentrations are measured in the overlying sediments, and this information is extrapolated to an areal release rate within the lake. This is the only method of estimating internal loadings which provides a direct measurement of phosphorus release. This method has been used by ERD on multiple occasions in previous work efforts and was selected as the quantification method for Lake Yale and Trout Lake.

Field and laboratory investigations were performed by ERD to quantify the mass of phosphorus released as a result of internal recycling from the sediments to the overlying water column in Lake Yale and Trout Lake under both aerobic and anoxic conditions. Large diameter lake sediment core samples were collected at multiple locations in each lake and incubated under anoxic and aerobic conditions. Periodic measurements of orthophosphorus and other water quality parameters were used to estimate sediment phosphorus release under the evaluated conditions. This information is used to provide an estimate of the significance of mass loadings of phosphorus from lake sediments as part of the overall nutrient budget for the two lakes.

5.1.4.1 Field and Laboratory Procedures

Sediment core samples were collected at multiple locations in Lake Yale and Trout Lake using 4-inch diameter clear acrylic core tubes. Locations used for collection of the sediment core tubes in Lake Yale are indicated on Figure 5-37, and for Trout Lake on Figure 5-38. Water depths at each site are also provided for reference purposes based on water depths indicated on the bathymetric map provided in Figure 2-5 for Lake Yale and in Figure 2-3 for Trout Lake. In general, the sample locations reflect the major areas of each lake and a variety of water depths. Each of the acrylic tubes was driven into the sediments to the maximum possible depth using a large hammer weight. A 4-inch x 4-inch wooden beam was placed on top of the acrylic core tubes to evenly distribute the force of each hammer blow and to prevent direct contact between the hammer weight and the acrylic tube.

The acrylic tubes were penetrated into the sediments to depths ranging from approximately 2-6 ft, depending upon the physical characteristics of the sediments at each of the selected monitoring sites or until a firm bottom material was encountered. Each of the core tubes was retrieved intact, along with the overlying water column present at each of the collection sites. Upon retrieval, a rubber cap was attached to the bottom of each core tube to prevent loss of sediments and water. The collected water volume above the trapped sediments was carefully siphoned off until a water depth of 18 inches remained in each of the collected columns above the sediment-water interface. Each of the acrylic core tubes was then cut at a uniform height of 6 inches above the water level, leaving a 6-inch air space between the water level and the top of the column. A 4-inch PVC cap was then placed on the top of each collected core tube, and the core tubes were returned to the ERD laboratory for incubation experimentation. All samples were transported to the ERD laboratory in a vertical position to avoid mixing of the sediment layers.

After return to the laboratory, each of the six collected core samples was attached to a laboratory work bench in a vertical position. Two separate 0.25-inch diameter holes were then drilled into the PVC cap attached to the top of each core sample. A 0.25-inch diameter semi-rigid polyethylene tube was inserted through one of the holes to a depth of approximately 2-3 inches above the sediment surface. An air stone diffuser was attached to the end of the tubing inside each core tube. This system was used to introduce selected gases into the core tubes to encourage aerobic or anoxic conditions.

A separate piece of polyethylene tubing was inserted into the second hole in the top of each core tube, approximately 1 inch below the level of the cap, but above the water level contained in each tube. The other end of the tubing was connected to a water trap to minimize loss of water from each column as a result of evaporation. This tubing also provided a point of exit for gases which were bubbled into each core tube. A schematic of the sediment incubation apparatus is given in Figure 5-39.

After initial set-up of the incubation apparatus, a compressed stream of nitrogen gas was introduced into each of the core tubes through the individual air stone diffusers which quickly created anoxic conditions within each of the core tubes. After anoxic conditions were established, as verified by an H_2S smell in the outflow from the water trap, the nitrogen gas addition was reduced to 1-2 hours per day, generally in association with a sampling event, to ensure completely mixed conditions within the tube. This process was continued in each of the core tubes for a period of approximately 28-29 days. The gas addition was used to ensure that water within each of the core tubes was well mixed without disturbing the sediments, so that phosphorus released from the sediments could be quantified as a function of changes in phosphorus concentrations within the water column of each core tube. On approximately a 1-2 day interval, 20 ml of water was withdrawn from each of the columns using a 0.25-inch polyethylene tube and a plastic laboratory syringe. Each of the collected samples was immediately filtered using a 0.45 micron syringe type membrane filter and analyzed for ammonia, NO_x, total nitrogen, orthophosphorus, and total phosphorus.



Figure 5-37.

Locations for Collection of Large Diameter Core Samples in Lake Yale.

(Water depth provided in parentheses)

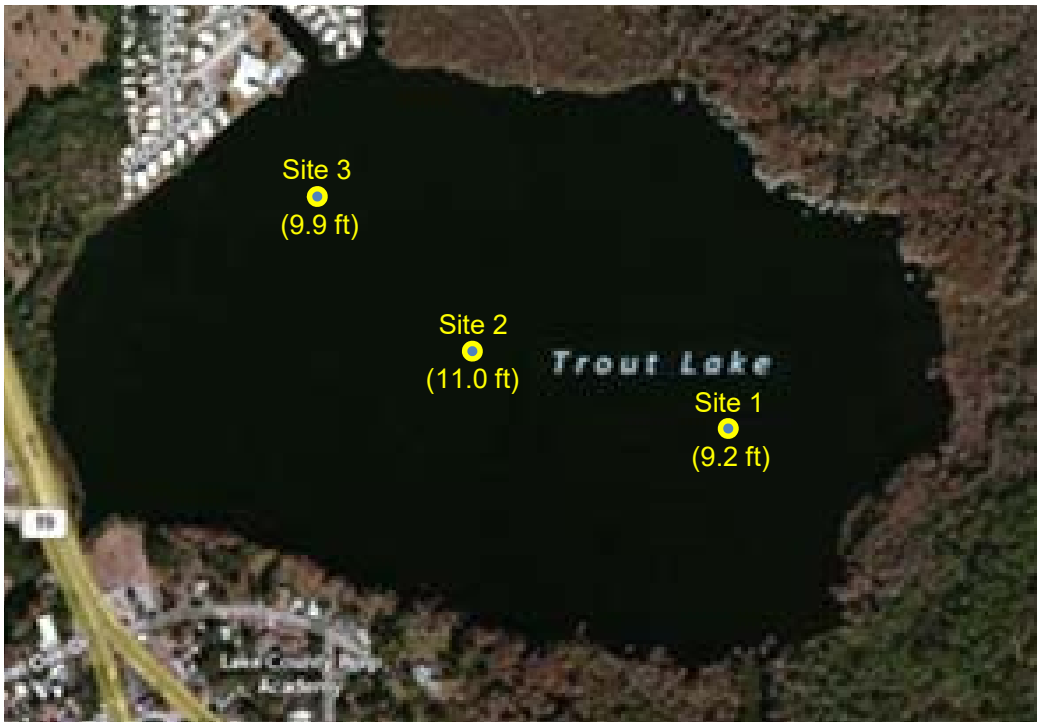


Figure 5-38.

Locations for Collection of Large Diameter Core Samples in Trout Lake.

(Water depth provided in parentheses)

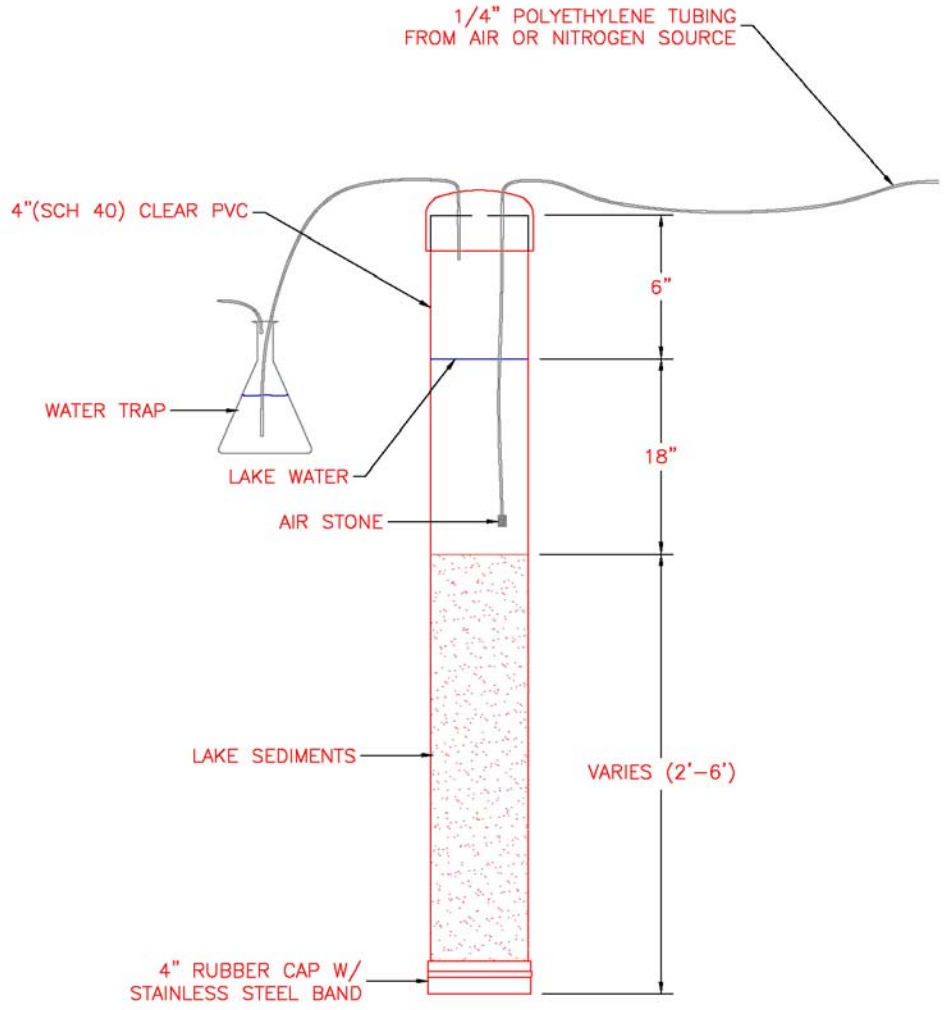


Figure 5-39. Schematic of Sediment Incubation Apparatus.

At the conclusion of the experimentation under anoxic conditions, the compressed nitrogen source was replaced with a compressed air source. Compressed air was gently bubbled through each of the columns to increase dissolved oxygen and create aerobic conditions within each tube. In general, creation of aerobic conditions, as indicated by measurements of redox potential (> 200 mv) within each of the columns, occurred within approximately 24 hours. At the onset of aerobic conditions, sample collection was conducted at a 1-2 day interval from each of the columns using the method previously outlined for anoxic conditions.

Collection of the large diameter (4-inch) sediment core samples was performed in Lake Yale during November 2015 and in Trout Lake during December 2015. Experimentation under anoxic conditions was conducted in each core tube for a period of 28 days. Aerobic experimentation was initiated at the end of the anoxic experiments and was continued for a period of 29 days.

5.1.4.2 Calculation of Mass Release

A summary of the laboratory results of samples collected during the sediment release testing program is given in Appendix J.1 for Lake Yale and in Appendix J.2 for Trout Lake. Changes in concentrations of phosphorus and nitrogen over time are provided for each of the isolation chamber experiments under both aerobic and anoxic conditions. The measured concentrations of total nitrogen, SRP, and total phosphorus from each sampling date (in μg/l) are multiplied by the volume of water in each large core cylinder (liter), corrected for volume losses due to sample collection, to obtain the mass of each measured parameter in the overlying water column over time (mass in μg). The mass of nitrogen and phosphorus is plotted as a function of time to evaluate the rate of change in mass over time, and the best-fit regression line through the points is used to calculate the release rate in terms of μg/day.

The mass release rate in the incubation experiments is defined as the slope of the rising limb of the total nitrogen, SRP, and total phosphorus release plots presented in Appendix J. In some chambers, an initial delay in phosphorus release occurred as anoxic or aerobic conditions were established within each chamber. In these cases, the release rate is calculated using the data obtained between the start of the upward release trend and the maximum phosphorus concentrations measured within a sample. In some experiments, phosphorus concentrations began to decrease after reaching the maximum concentration, presumably due to biological uptake within the chamber. These data are also excluded from estimation of the release rate. Regression relationships developed for estimation of sediment phosphorus release rates in the incubation experiments under aerobic and anoxic conditions are included in Appendix J.1 for Lake Yale and in Appendix J.2 for Trout Lake.

Estimates of the areal extent and frequency of aerobic and anoxic conditions within the sediments of the two lakes were obtained from the vertical field profiles conducted in each lake by ERD from March 2015-March 2016. These profiles (summarized in Figures 2-49 and 2-50 for Trout Lake and in Figures 2-57 through 2-61 for Lake Yale) provide seasonal patterns of dissolved oxygen concentrations throughout each of the lakes. The percentage of events indicating anoxic conditions at the water-sediment interface, indicated by dissolved oxygen concentrations less than 2 mg/l, were calculated for each of the field monitoring sites and used to estimate the seasonal distribution of aerobic and anoxic conditions throughout each lake.

5.1.4.2.1 Lake Yale

A summary of calculated sediment phosphorus release rates during the isolation chamber experiments for sediment core samples collected in Lake Yale is given in Table 5-15. Release rates are provided for total nitrogen, SRP, and total phosphorus in each of the 5 isolation chamber core samples under both aerobic and anoxic conditions. The release rates reflect the slope of the total nitrogen, SRP, and total phosphorus release rate plots provided in Appendix J.1. The calculated release rates are converted into a mass release per day by dividing by the surface area of the 4-inch diameter incubation chambers, resulting in an areal mass release in terms of mg/m^2-day.

TABLE 5-15

MEASURED SEDIMENT NUTRIENT RELEASE RATES IN ISOLATION CHAMBER CORE SAMPLES COLLECTED IN LAKE YALE

CONDITION	LARGE CORE SITE	MASS NUTRIENT RELEASE (μg/day)			MASS NUTRIENT RELEASE (mg/m^2-day)		
		SRP	Total P	Total N	SRP	Total P	Total N
Aerobic	1	0.91	1.96	130	0.11	0.25	16.3
	2	0.59	1.24	54	0.07	0.16	6.7
	3	4.12	6.00	358	0.52	0.75	44.8
	4	0.92	4.52	381	0.12	0.57	47.6
	5	1.03	2.15	236	0.13	0.27	29.5
	Mean	**1.51**	**3.17**	**232**	**0.19**	**0.40**	**29.0**
Anoxic	1	2.60	5.4	13.7	0.33	0.68	1.7
	2	3.12	9.4	76.1	0.39	1.17	9.5
	3	23.8	34.7	151	2.98	4.34	18.9
	4	22.4	31.4	123	2.80	3.93	15.4
	5	2.75	5.3	70.3	0.34	0.66	8.8
	Mean	**10.9**	**17.2**	**86.8**	**1.37**	**2.15**	**10.9**

Under aerobic conditions, the mean mass release rate for total nitrogen ranged from 6.7-47.6 mg/m^2-day in the five sediment isolation chambers, with SRP release ranging from 0.07-0.52 mg/m^2-day, and total phosphorus release ranging from 0.16-0.75 mg/m^2-day. Overall, SRP release contributed approximately 48% of the measured total phosphorus release under aerobic conditions. Under anoxic conditions, the mass release rates increased substantially for phosphorus species, ranging from 0.33-2.98 mg/m^2-day for SRP and 0.68-4.34 mg/m^2-day for total phosphorus. Release of total nitrogen decreased under anoxic conditions, presumably due to loss by denitrification, with anoxic release rates ranging from 1.7-18.9 mg/m^2-day.

A summary of calculated annual sediment nutrient release in Lake Yale is given in Table 5-16. The release is calculated using the mass release rates summarized on Table 5-15 for each of the 5 isolation chamber sites, weighted by the fraction of aerobic and anoxic conditions assumed to occur in the vicinity of each large diameter core tube monitoring site, based upon the vertical field profiles for Lake Yale summarized in Section 2. Information on the potential for anoxic conditions to occur at each of the large core monitoring sites is based upon field measurements collected by ERD from March 2015-March 2016 at the closest adjacent surface water monitoring site.

TABLE 5-16

CALCULATED ANNUAL SEDIMENT NUTRIENT RELEASE IN LAKE YALE

LARGE CORE SITE	GENERAL LAKE AREA	CLOSEST SURFACE WATER SITE	FREQUENCY OF CONDITION (%)		WEIGHTED NUTRIENT RELEASE (mg/m^2-day)			ASSUMED AREA (acres)	MASS NUTRIENT RELEASE (kg/yr)		
			Aerobic	Anoxic	SRP	Total P	Total N		SRP	Total P	Total N
1	Southeast	4	58	42	0.20	0.43	10.1	802.4	240	507	12,029
2	East	3	17	83	0.34	1.00	9.0	802.4	399	1,184	10,716
3	South	2	83	17	0.93	1.36	40.4	802.4	1,107	1,613	47,850
4	North	--*	17	83	2.34	3.35	20.9	802.4	2,779	3,977	24,734
5	West	1	17	83	0.31	0.59	12.3	802.4	364	700	14,596
				Geometric Mean:	**0.54**	**1.03**	**15.69**	**4,012**	**4,889**	**7,981**	**109,924**

*Average of surface water Sites 1 and 3

Large core monitoring Sites 1, 2, 3, and 5 are located in the general vicinity of monitoring sites used for collection of surface water data. Large core collection Site 4 is located approximately mid-way between surface water monitoring Sites 1 and 3 which had similar percentages for anoxic conditions during the field monitoring program. For example, large core monitoring Site 1 (located in the southeast portion of Lake Yale) is located close to surface water monitoring Site 4. During the 12-month field monitoring program, anoxic conditions were observed at the water-sediment interface at this site during 5 of the 12 monitoring events. Therefore, nutrient release is assumed to be reflected by anoxic release rates approximately 42% of the time (5 of 12 events), with aerobic conditions maintained approximately 58% of the time (7 of 12 events). Large core monitoring Site 2 (located on the east side of Lake Yale) is in close proximity to surface water monitoring Site 3 which exhibited anoxic conditions at the water-sediment interface during 10 of the 12 monitoring events. Therefore, aerobic conditions are assumed to be maintained at this site approximately 17% of the time (2 of 12 events), with anoxic conditions maintained 83% of the time (10 of 12 evens). Percentages of aerobic and anoxic conditions were calculated in a similar manner for large core Sites 3 and 5, with Site 4 calculated as the average of oxygen profiles collected at surface water monitoring Sites 1 and 3, both of which exhibited anoxic conditions during 10 of the 12 monitoring events.

The measured aerobic and anoxic release rates (summarized in Table 5-15) were weighted by the estimated frequency of occurrence of aerobic and anoxic conditions to get estimates of mean annual nutrient release for total nitrogen, SRP, and total phosphorus within each core tube. Overall, the log-normal mean SRP release rate for Lake Yale is approximately 0.54 mg/m^2-day, with a release rate of 1.03 mg/m^2-day for total phosphorus and a rate of 15.7 mg/m^2-day for total nitrogen. The calculated weighted nutrient release rates for each of the large core monitoring sites are assumed to reflect approximately equal portions of the surface area of Lake Yale. Since there are 5 large core monitoring sites for which release rates measurements were conducted, the weighted nutrient release rates are each assumed to occur over one-fifth of the lake surface area for each collected large core site. The weighted areal nutrient release rates are then multiplied by the assumed lake area over which the release rates apply to obtain estimates of overall nutrient release from the sediments into Lake Yale on an annual basis.

Estimates of annual mass nutrient release from sediments in Lake Yale are provided at the bottom of the final columns in Table 5-16. On an average annual basis, sediment nutrient release contributes approximately 4,889 kg/yr of SRP, 7,981 kg/yr of total phosphorus, and 109,925 kg/yr of total nitrogen to Lake Yale. This information is used in a subsequent section to generate an overall nutrient mass balance for Lake Yale.

5.1.4.2.2 Trout Lake

A summary of calculated nutrient release rates for sediment core samples collected in Trout Lake during the isolation chamber experiments is given in Table 5-17. Release rates are provided for total nitrogen, SRP, and total phosphorus for each of the 3 isolation chamber core samples which were incubated under both aerobic and anoxic conditions. The release rates summarized in Table 5-17 reflect the slope of the total nitrogen, SRP, and total phosphorus release rate plots provided in Appendix J.2. The calculated release rates are converted into a mass release per day by dividing by the surface area of the 4-inch diameter incubation chambers, resulting in an areal mass release in terms of mg/m^2-day.

TABLE 5-17

MEASURED SEDIMENT NUTRIENT RELEASE RATES IN ISOLATION CHAMBER CORE SAMPLES COLLECTED IN TROUT LAKE

CONDITION	LARGE CORE SITE	MASS NUTRIENT RELEASE (µg/day)			MASS NUTRIENT RELEASE (mg/m^2-day)		
		SRP	Total P	Total N	SRP	Total P	Total N
Aerobic	1	4.1	6.3	84.6	0.52	0.79	10.6
	2	3.0	6.0	31.4	0.38	0.75	3.9
	3	5.6	7.1	30.1	0.70	0.89	3.8
	Mean	**4.2**	**6.5**	**48.7**	**0.53**	**0.81**	**6.1**
Anoxic	1	9.9	12.2	97.8	1.24	1.53	12.2
	2	5.9	7.0	48.4	0.74	0.87	6.1
	3	7.5	8.0	124	0.94	1.00	15.6
	Mean	**7.8**	**9.1**	**90.1**	**0.97**	**1.13**	**11.3**

Under aerobic conditions, SRP release rates ranged from 0.38-0.70 mg/m^2-day, with total phosphorus release rates ranging from 0.75-0.89 mg/m^2-day, and total nitrogen release rates ranging from 3.8-10.6 mg/m^2-day. Under anoxic conditions, mass release rates increased for each of the evaluated parameters, with anoxic release rates for SRP ranging from 0.74-1.24 mg/m^2-day, total phosphorus ranging from 0.87-1.53 mg/m^2-day, and total nitrogen ranging from 6.1-15.6 mg/m^2-day. Under aerobic conditions, SRP comprises approximately 65% of the total phosphorus release, increasing to approximately 83% under anoxic conditions.

A summary of calculated annual sediment nutrient release in Trout Lake is given in Table 5-18. These release rates were calculated using the individual mass release rates summarized on Table 5-17 weighted by the fraction of aerobic and anoxic conditions assumed to occur in the vicinity of each large diameter core tube, based upon the vertical field profiles for Trout Lake summarized in Section 2. For example, the closest surface water monitoring site to large core collection Site 1 is surface water Site 2. During the field collection program from March 2015-March 2016, anoxic conditions were observed at this site during 11 of the 12 monitoring events. Large core collection Site 3 is located in close proximity to surface water monitoring Site 1 which exhibited anoxic conditions during 9 of the 12 monitoring events. Large core collection Site 2 (located in the center of Trout Lake) is assumed to have anoxic conditions equal to the average of conditions observed at surface water Sites 1 and 2, with an estimated frequency of 10 out of 12 months.

TABLE 5-18

CALCULATED ANNUAL SEDIMENT NUTRIENT RELEASE IN TROUT LAKE

LARGE CORE SITE	GENERAL LAKE AREA	CLOSEST SURFACE WATER SITE	FREQUENCY OF CONDITION (%)		WEIGHTED NUTRIENT RELEASE (mg/m^2-day)			ASSUMED AREA (acres)	MASS NUTRIENT RELEASE (kg/yr)		
			Aerobic	Anoxic	SRP	Total P	Total N		SRP	Total P	Total N
1	East	2	8	92	1.18	1.47	12.1	35.3	62	77	631
2	Center	--*	17	83	0.68	0.85	5.7	35.3	36	44	297
3	Northwest	1	25	75	0.88	0.97	12.6	35.3	46	51	656
Geometric Mean:					**0.89**	**1.07**	**9.53**	**106.0**	**143**	**172**	**1,585**

*Average of surface water Sites 1 and 2

The procedure described in the previous paragraph results in an estimate of the weighted nutrient release per unit area in Trout Lake on an average annual basis. Overall, weighted SRP release rates in Trout Lake range from 0.68-1.18 mg/m2-day, with total phosphorus release rates ranging from 0.85-1.47 mg/m2-day, and total nitrogen release rates ranging from 5.7-12.6 mg/m2-day.

The observed release rates at each of the 3 large core monitoring sites are assumed to reflect sediment release conditions over approximately one-third of the total area in Trout Lake, or approximately 33.3 acres for each large core site. When the mass nutrient release is extended over the assumed area for each large core site, estimates of annual mass nutrient loadings to Trout Lake are obtained. Overall, sediment nutrient release contributes approximately 143 kg/yr of SRP, 172 kg/yr of total phosphorus, and 1,585 kg/yr of total nitrogen to the lake.

5.2 Nutrient Losses

Nutrient losses from Lake Yale and Trout Lake occur primarily as a result of discharges through the lake outfall structures and losses due to aquifer recharge. Pollutant mass which is not discharged through the outfall structures or lost to deep recharge is assumed to accumulate into the sediments of each lake. Estimates of the magnitude of nutrient losses by these mechanisms are given in the following sections.

5.2.1 Outfall Structure Discharges

5.2.1.1 Chemical Characteristics of Outfall Discharges

Chemical characteristics of discharges from Lake Yale and Trout Lake through outfall structures are assumed to be similar to historical water quality characteristics in the two lakes. A summary of historical water quality characteristics for the lakes was provided in Section 2, with a complete list of available historical water quality data given in Appendix B for Trout Lake and in Appendix C for Lake Yale. For purposes of estimating water quality characteristics of discharges from the lakes, the lake water quality is assumed to be the average water quality characteristics in the two lakes from 2010-2015 to reflect relatively current conditions. A summary of mean water quality characteristics in Lake Yale and Trout Lake from 2010-2015 is given in Table 5-19, and these values are assumed to reflect the characteristics of discharges through the outfall structures of each lake.

TABLE 5-19

MEAN WATER COLUMN CHARACTERISTICS OF LAKE YALE AND TROUT LAKE FROM 2010-2015

LAKE	TOTAL N (µg/l)	TOTAL P (µg/l)	TSS (mg/l)
Yale	1,863	28	5.0
Trout	2,317	269	11.0

5.2.1.2 Mass Loadings

Calculated mass losses through the outfall structures for Lake Yale and Trout Lake are summarized in Table 5-20. These values were obtained by multiplying the mean water column characteristics (summarized in Table 5-19) times the mean annual volumetric discharges through the lake outfall structures (summarized in Table 4-17) for Lake Yale and in Table 4-19 for Trout Lake. This information is used in a subsequent section to develop overall nutrient budgets for the two lakes.

TABLE 5-20

CALCULATED MEAN ANNUAL MASS LOSSES FROM LAKE YALE AND TROUT LAKE THROUGH THE OUTFALL STRUCTURES

LAKE	OUTFALL DISCHARGE VOLUME (ac-ft)	MASS LOSS (kg)		
		Total N	Total P	TSS
Yale	2,391	5,497	82.6	14,753
Trout	1,302	3,719	432	17,655

5.2.2 Deep Aquifer Losses

5.2.2.1 Chemical Characteristics of Deep Aquifer Discharges

Chemical characteristics of discharges from Lake Yale and Trout Lake as a result of recharge to deeper aquifers are assumed to be similar to the historical water quality characteristics in the two lakes summarized in Table 5-19. These historical water quality characteristics are assumed to represent the characteristics of surface water within the lake which is applicable to outflow discharges as well as lake water lost through the lake bottom.

5.2.2.2 Mass Loadings

Calculated mass losses from deep aquifer recharge in Lake Yale and Trout Lake are summarized in Table 5-21. These values were obtained by multiplying the mean water column characteristics (summarized in Table 5-19) times the mean annual volumetric losses from the two lakes resulting from deep aquifer recharge. A summary of estimated annual deep recharge losses from Lake Yale and Trout Lake is provided in Table 4-15.

TABLE 5-21

CALCULATED MEAN ANNUAL LOSSES FROM LAKE YALE AND TROUT LAKE AS A RESULT OF AQUIFER RECHARGE

LAKE	DEEP RECHARGE VOLUME (ac-ft/yr)	MASS LOSS (kg/yr)		
		Total N	Total P	TSS
Yale	2,887	6,633	99.7	17,802
Trout	17.7	50.6	5.9	240

A summary of calculated mean annual losses from Lake Yale and Trout Lake as a result of aquifer recharge is given in Table 5-21. The assumed deep recharge volume for Lake Yale is substantially greater than the deep recharge volume for Trout Lake as a result of the larger lake area and enhanced recharge rates estimated by Huang and Smith (2015). The information summarized in Table 5-21 is used in a subsequent section to develop overall nutrient budgets for the two lakes.

5.3 Mean Annual Mass Budgets

Estimated mean annual mass budgets were developed for total nitrogen, total phosphorus, and TSS discharging to Lake Yale and Trout Lake based upon the analyses presented in the previous sections. A discussion of estimated mass inputs and losses to the two lakes is given in the following sections.

5.3.1 Mass Inputs

5.3.1.1 Lake Yale

A summary of estimated mean annual mass loadings of total nitrogen, total phosphorus, and TSS to Lake Yale is given in Table 5-22. The estimated mass loadings summarized in this table are based upon the assumptions and analyses presented in previous sections. The dominant source of nitrogen loading to Lake Yale appears to be bulk precipitation which contributes approximately 64% of the calculated mean annual nitrogen loadings. Approximately 18% of the annual nitrogen loading is contributed by groundwater seepage, with 12% by stormwater runoff and 6% by internal recycling. Contributions of total nitrogen from overland flow contribute less than 1% on an average annual basis.

TABLE 5-22

CALCULATED MEAN ANNUAL LOADINGS OF TOTAL NITROGEN, TOTAL PHOSPHORUS, AND TSS DISCHARGING TO LAKE YALE

SOURCE	TOTAL NITROGEN LOADING		TOTAL PHOSPHORUS LOADING		TSS LOADING	
	kg/yr	% of Total	kg/yr	% of Total	kg/yr	% of Total
Bulk Precipitation	15,771	64	1,249	13	354,340	95
Runoff	2,985	12	507	5	16,984	5
Overland Flow	27	< 1	1.6	< 1	162	< 1
Groundwater Seepage	4,341	18	149	2	0	0
Internal Recycling	1,429	6	7,981	80	0	0
Totals:	**24,553**	**100**	**9,888**	**100**	**371,486**	**100**

Internal recycling is clearly the largest phosphorus input to Lake Yale, contributing 80% of the estimated annual phosphorus loading. Approximately 13% of the annual loading is contributed by bulk precipitation, with 5% from runoff and 2% from groundwater seepage. Overland flow contributes less than 1% of the annual phosphorous load to Lake Yale.

The dominant source of TSS loadings to Lake Yale is bulk precipitation which contributes 95% of the annual solids loadings to the lake. The remaining 5% is contributed by stormwater runoff, with minimal loadings contributed by the remaining sources. Overall, approximately 24,553 kg/yr of total nitrogen discharge to Lake Yale, with 9,888 kg/yr of total phosphorus, and 371,486 kg/yr of TSS.

A comparison of estimated annual mass loadings of total nitrogen, total phosphorus, and TSS to Lake Yale is given on Figure 5-40.

5.3.1.2 Trout Lake

A summary of estimated mean annual mass loadings of total nitrogen, total phosphorus, and TSS to Trout Lake is given in Table 5-23, based upon the assumptions and analyses presented in previous sections. The dominant source of nitrogen loading to Trout Lake appears to be stormwater runoff which contributes approximately 50% of the mean annual nitrogen loadings to the lake. Approximately 30% of the annual nitrogen loading is contributed by internal recycling, with 12% by groundwater seepage and 8% by bulk precipitation. Contributions of total nitrogen from overland flow contribute less than 1% on an average annual basis.

TABLE 5-23

CALCULATED MEAN ANNUAL LOADINGS OF TOTAL NITROGEN, TOTAL PHOSPHORUS, AND TSS DISCHARGING TO TROUT LAKE

SOURCE	TOTAL NITROGEN LOADING		TOTAL PHOSPHORUS LOADING		TSS LOADING	
	kg/yr	% of Total	kg/yr	% of Total	kg/yr	% of Total
Bulk Precipitation	418	8	33.1	6	9,382	46
Runoff	2,722	50	214	40	10,796	54
Overland Flow	< 1	< 1	0.0	< 1	1	< 1
Groundwater Seepage	644	12	108	21	0	0
Internal Recycling	1,585	30	172	33	0	0
Totals:	**5,368**	**100**	**527**	**100**	**20,179**	**100**

Stormwater runoff is also the dominant phosphorus loading to Trout Lake, contributing 40% of the overall annual phosphorus load. Approximately 33% of the annual phosphorus loading originates from internal recycling, with 21% by groundwater seepage, and 6% by bulk precipitation.

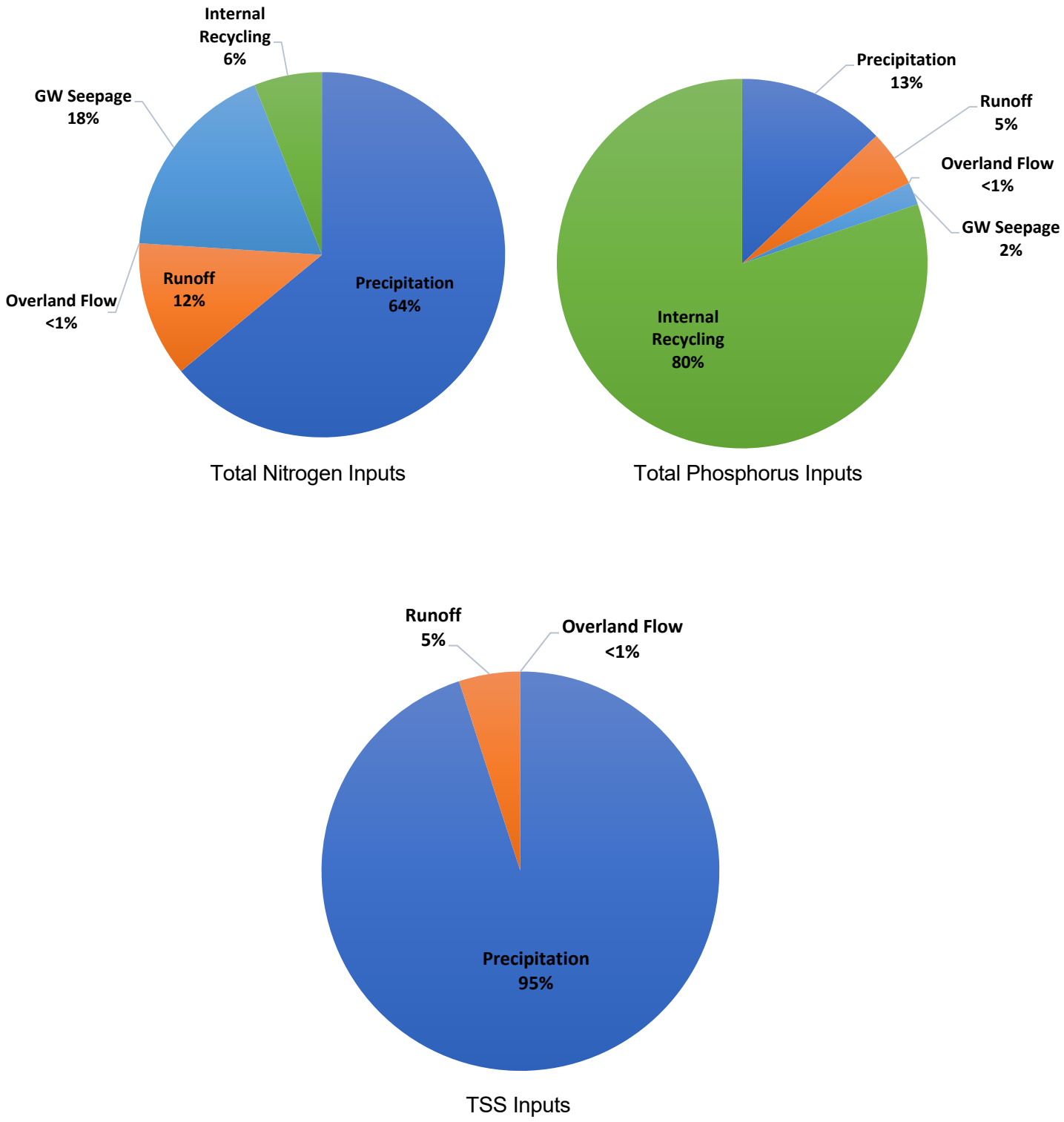


Figure 5-40. Comparison of Estimated Annual Mass Loadings of Total Nitrogen, Total Phosphorus, and TSS Discharging to Lake Yale.

Approximately 54% of the annual TSS loadings to Trout Lake originate from stormwater runoff, with 46% contributed by bulk precipitation. Annual TSS loadings by the remaining sources are considered to be minimal.

A comparison of estimated annual mass loadings of total nitrogen, total phosphorus, and TSS to Trout Lake is given on Figure 5-41.

5.3.2 Mass Losses

5.3.2.1 Lake Yale

A summary of estimated annual mass losses of total nitrogen, total phosphorus, and TSS from Lake Yale is given in Table 5-24 based upon analyses provided in previous sections. On an average annual basis, approximately 51% of the total nitrogen, 98% of the total phosphorus, and 91% of the TSS loading is retained within the sediments of the lake. The remaining mass loadings for total nitrogen, total phosphorus, and TSS are lost due to the combined effects of outfall discharges and lost to deep recharge. A graphical comparison of calculated annual losses from Lake Yale is given on Figure 5-42.

TABLE 5-24

CALCULATED ANNUAL LOSSES OF TOTAL NITROGEN, TOTAL PHOSPHORUS, AND TSS DISCHARGING FROM LAKE YALE

SOURCE	TOTAL NITROGEN LOADING		TOTAL PHOSPHORUS LOADING		TSS LOADING	
	kg/yr	% of Total	kg/yr	% of Total	kg/yr	% of Total
Outflow	5,497	22	82.6	1	14,753	4
Deep Recharge	6,633	27	99.7	1	17,802	5
Sediments	12,423	51	9,706	98	338,931	91
Totals:	**24,553**	**100**	**9,888**	**100**	**371,486**	**100**

5.3.2.2 Trout Lake

A tabular summary of estimated annual mass losses of total nitrogen, total phosphorus, and TSS from Trout Lake is given on Table 5-25. The vast majority of inputs to Trout Lake leave the lake through the lake outflow which accounts for 69% of the annual nitrogen losses, 82% of the annual phosphorus losses, and 87% of the annual losses of TSS. The remaining percentages are retained within the lake, equivalent to 31% of the total nitrogen loading, 18% of the total phosphorus loading, and 13% of the annual TSS loading. The substantially lower retention rate for nutrients in Trout Lake is due to the shorter residence time within the lake compared with the much longer residence time observed in Lake Yale and inhibition of biological uptake mechanisms by the high water color. In addition, input concentrations for nitrogen and phosphorus to Trout Lake are extremely elevated in value, and little additional removal occurs for these parameters within the lake system. A graphical comparison of estimated annual inputs and losses for Trout Lake is given in Figure 5-43.

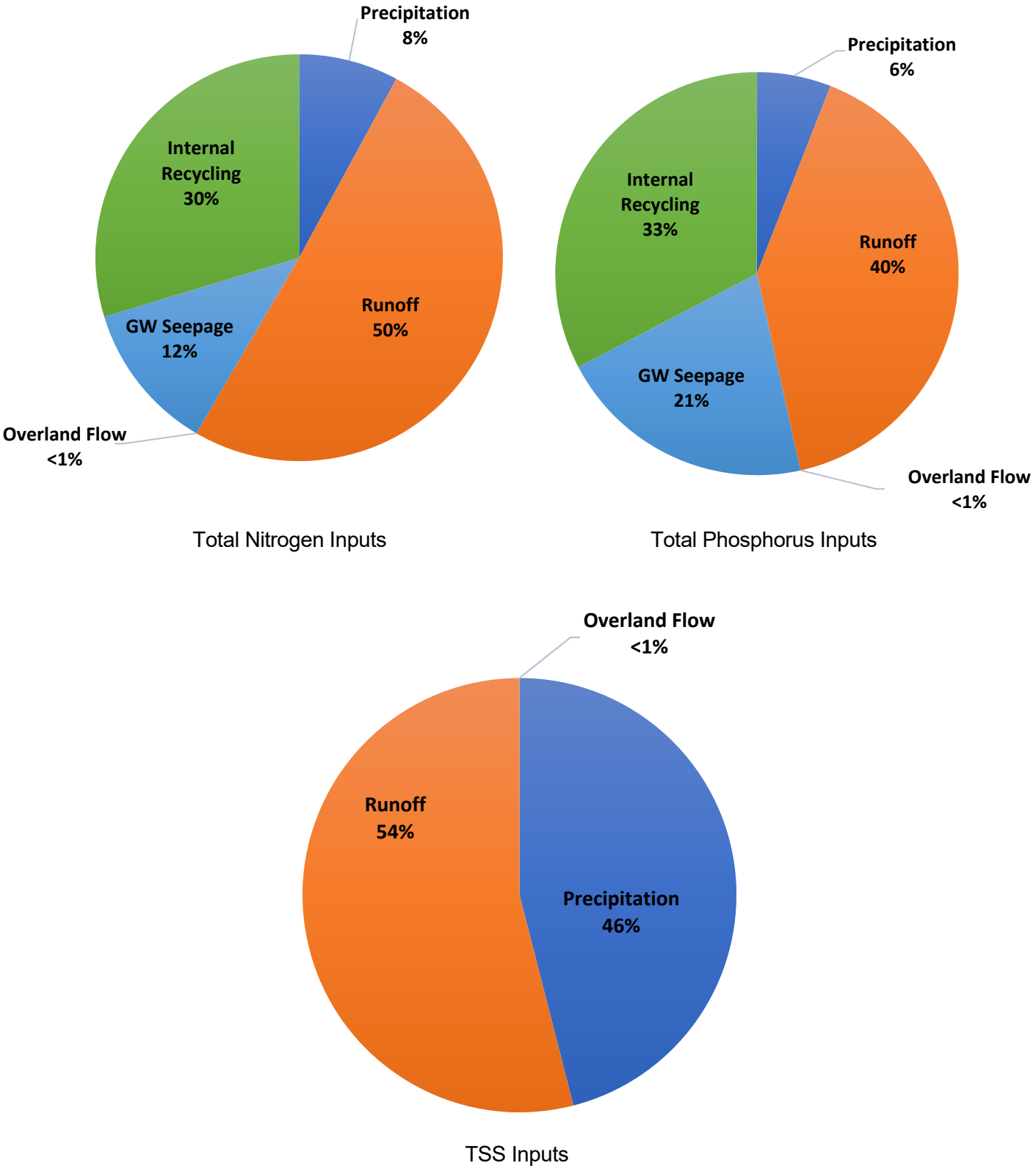


Figure 5-41. Comparison of Estimated Annual Mass Loadings of Total Nitrogen, Total Phosphorus, and TSS Discharging to Trout Lake.

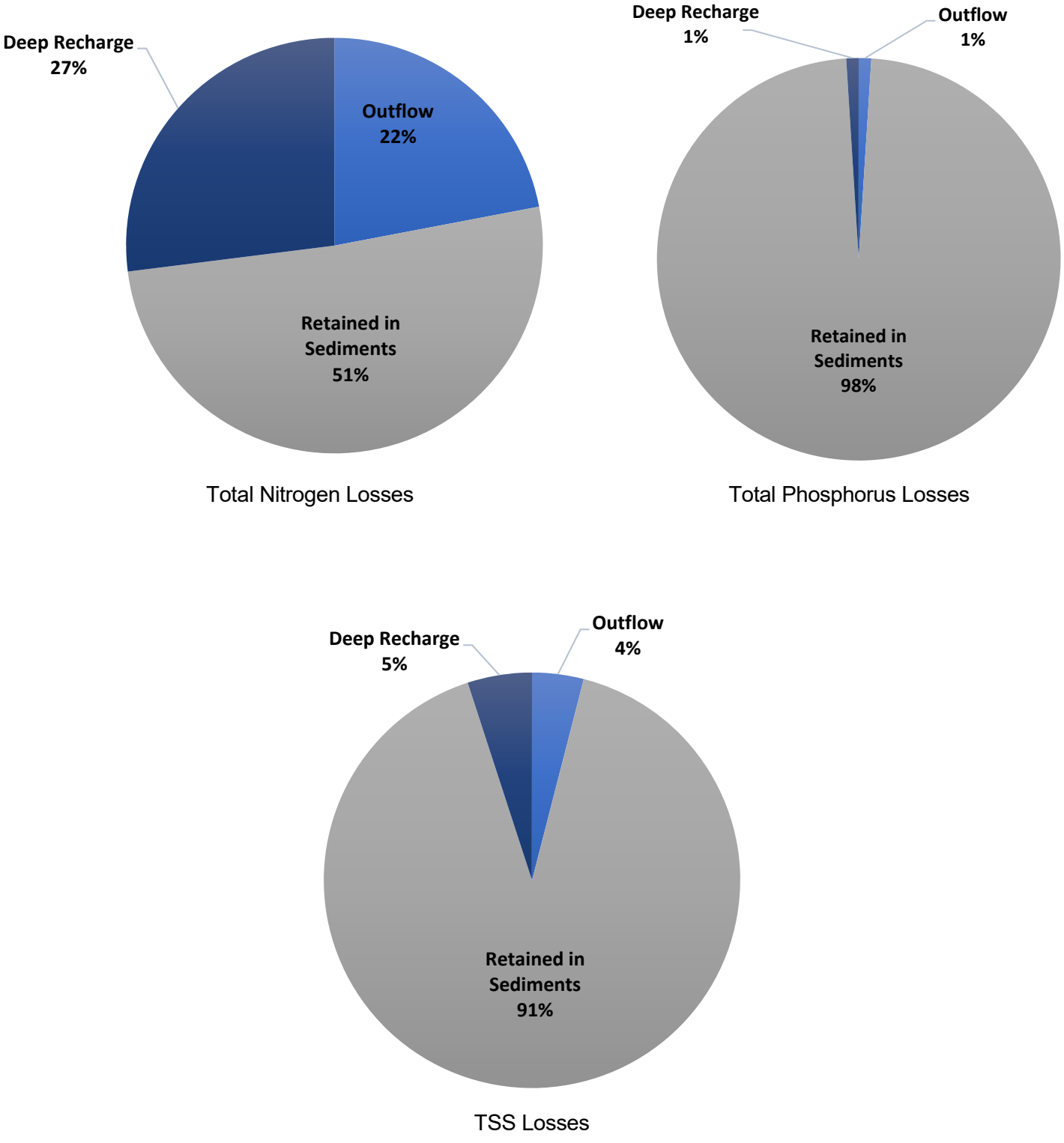
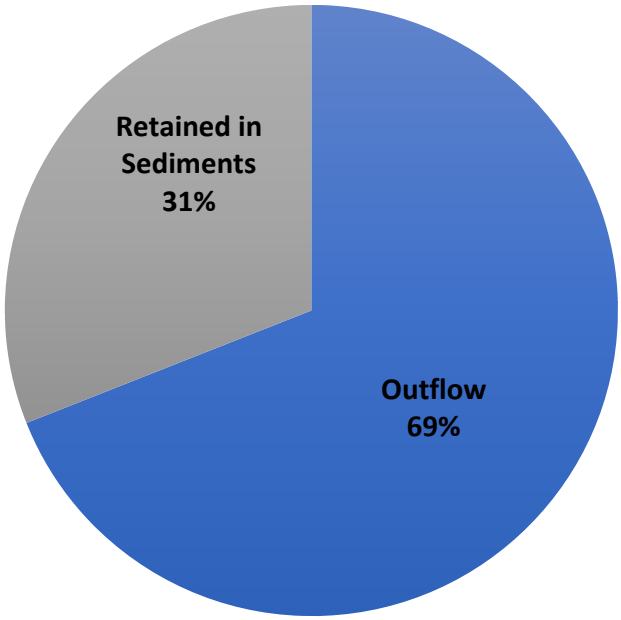
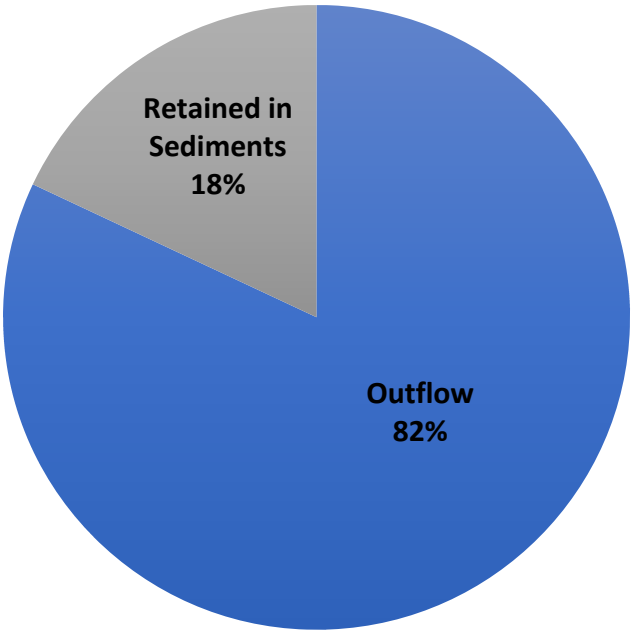


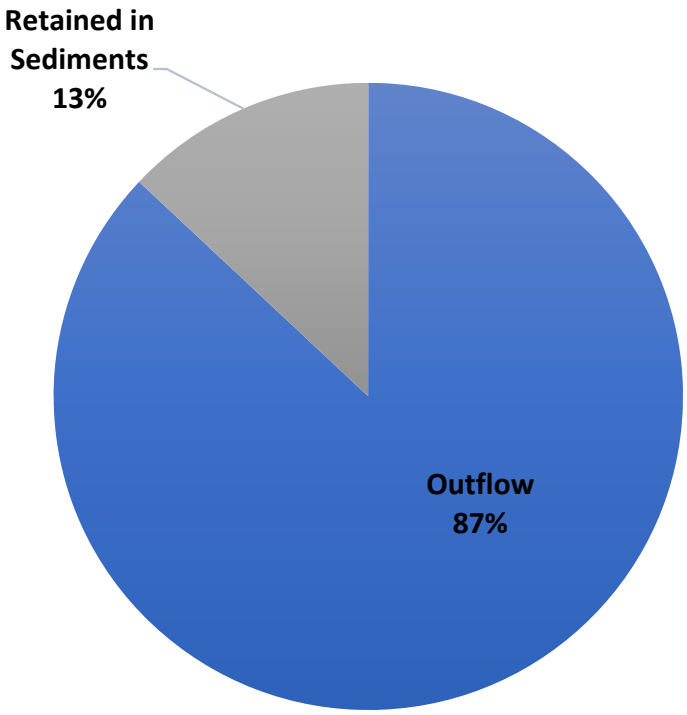
Figure 5-42. Comparison of Estimated Annual Mass Losses of Total Nitrogen, Total Phosphorus, and TSS from Lake Yale.



Total Nitrogen Losses



Total Phosphorus Losses



TSS Losses

Figure 5-43. Comparison of Estimated Annual Mass Losses of Total Nitrogen, Total Phosphorus, and TSS from Trout Lake.

TABLE 5-25

CALCULATED ANNUAL LOSSES OF TOTAL NITROGEN, TOTAL PHOSPHORUS, AND TSS DISCHARGING FROM TROUT LAKE

SOURCE	TOTAL NITROGEN LOADING		TOTAL PHOSPHORUS LOADING		TSS LOADING	
	kg/yr	% of Total	kg/yr	% of Total	kg/yr	% of Total
Lake Outflow	3,719	69	432	82	17,655	87
Retained	1,649	31	96	18	2,524	13
Totals:	**5.368**	**100**	**527**	**100**	**20,179**	**100**

5.3.3 Areal Nutrient Loading Rates

A comparison of estimated annual total and areal loadings of nitrogen and phosphorus to Lake Yale and Trout Lake, based upon the nutrient budgets summarized in Table 5-22, is given in Table 5-26. Based upon the identified phosphorus inputs, the areal phosphorus loading to Lake Yale is approximately 0.61 g/m^2-yr, with an areal phosphorus loading to Trout Lake of 1.23 g/m^2-yr. A summary of permissible nutrient loading levels for lakes up to 15 m deep, developed by Vollenweider (1968), is provided at the bottom of Table 5-26. According to Vollenweider, lakes with areal phosphorus loadings less than 0.1 g/m^2-yr typically maintain oligotrophic characteristics, while lakes with more than 0.2 g/m^2-yr will exhibit a trend of accelerated algal growth and potential for seasonal algal blooms and eutrophic conditions. Based upon these criteria, the current phosphorus loadings to Lake Yale and Trout Lake exceed the permissible loading level recommended by Vollenweider by a factor of 6 for Lake Yale and a factor of 10 for Trout Lake.

TABLE 5-26

COMPARISON OF ANNUAL AREAL LOADINGS OF NITROGEN AND PHOSPHORUS TO LAKE YALE AND TROUT LAKE

LAKE	AREA (acres)	PHOSPHORUS LOADING		NITROGEN LOADING	
		kg/yr	g/m^2-yr	kg/yr	g/m^2-yr
Yale	4,012	9,888	0.61	24,553	1.51
Trout	106	527	1.23	5,368	12.5

Permissible Loading Levels (Vollenweider, 1968) for Lakes up to 15 m Deep:

1. Phosphorus:
   a. Permissible: <0.1 g/m^2-yr
   b. Dangerous: >0.2 g/m^2-yr
2. Nitrogen:
   a. Permissible: <1.5 g/m^2-yr
   b. Dangerous: >3.0 g/m^2-yr

Areal loading rates for total nitrogen in Lake Yale and Trout Lake are also summarized in Table 5-26. Based upon this analysis, Lake Yale has an estimated annual nitrogen loading of 1.5 g/m^2-yr which is near the “permissible” loading recommended by Vollenweider. However, the areal nitrogen loading rate for Trout Lake is 12.5 g/m^2-yr which substantially exceeds the dangerous level of 3.0 g/m^2-yr for nitrogen established by Vollenweider.

SECTION 6

WATER QUALITY MODEL

As discussed in previous sections, reductions in algal productivity in Lake Yale and Trout Lake can only be achieved by reducing phosphorus loadings to each lake. The growth of algae within the two lakes is directly correlated to the amount of phosphorus added since all other elements necessary for growth are already present in abundance of the needs of the algae. As a result, water quality models for the two lakes are based on phosphorus only.

6.1 Model Components

Separate interlinked water quality models were developed for Lake Yale and Trout Lake for use in predicting anticipated water quality improvements resulting from evaluated phosphorus management options. The water quality models are developed on a monthly basis using the hydrologic inputs and losses summarized in Section 4 and the annual phosphorus budget summarized in Section 5. Calculation of water quality on a monthly basis allows examination of variability in water quality characteristics over an annual cycle. Phosphorus inputs to Lake Yale (summarized in Table 5-22) and to Trout Lake (summarized in Table 5-23) are assumed to represent phosphorus loadings into the two lakes during average annual conditions. The models are calibrated under existing conditions using mean historical water quality characteristics in the two lakes over the period from 2005-2015 to reflect a wide range of water quality conditions. The interlinked models are then used to predict improvements in water quality characteristics resulting from evaluated phosphorus management options.

The water quality models were developed using a modified Vollenweider phosphorus limitation model as proposed by Vollenweider (1976), Vollenweider and Dillon (1974), and Dillon and Rigler (1974). Prediction of in-lake phosphorus concentrations are based upon four parameters, including the estimated annual phosphorus inputs to the lake, a phosphorus retention coefficient which is based upon phosphorus sedimentation dynamics, the mean depth of the lake, and the flushing rate for the lake system.

The first step in modeling involves estimation of the phosphorus retention coefficient, R_{TP}, which is an estimate of the fraction of phosphorus inputs which are retained within the lake. The phosphorus retention coefficient for any lake can be estimated based upon the lake flushing time and mean depth as proposed by Vollenweider (1976):

$$R_{TP} = \frac{\sigma}{\rho\bar{z} + \sigma}$$

where:

R_{TP} = phosphorus retention coefficient (dimensionless)

ρ = lake flushing rate, Q/V = (inflow/time)/(lake volume)

$\bar{z}$ = lake mean depth = lake volume/surface area (m)

σ = sedimentation rate coefficient (1/time)

The sedimentation rate coefficient (σ), which appears in both the numerator and denominator of the phosphorus retention coefficient formula, is often considered to be analogous to an apparent settling velocity for total phosphorus. This coefficient is different for each lake and is impacted by parameters such as flushing lake, mean depth, sediment composition degree, impacts of boating activities, and hydraulic factors. Both empirical and theoretical formulations for the phosphorus retention coefficient suggest that this coefficient decreases as the flushing rate of the lake increases. This inverse relationship appears appropriate since, as flushing rate increases, there is less time for phosphorus to settle, resulting in a decrease in the retention coefficient.

Estimates of equilibrium total phosphorus concentrations within the lakes are developed based upon the relationship proposed by Vollenweider and Dillon (1974):

$$TP = \frac{L_p \ (1 \ - \ R_{TP})}{\bar{z} \ * \ \rho}$$

where:

TP = total phosphorus concentration (mg/l)

L_p = areal total phosphorus loading (mg/m^2-time)

R_{TP} = phosphorus retention coefficient (dimensionless)

ρ = lake flushing rate (1/time)

$\bar{z}$ = mean depth (m)

Estimates of in-lake equilibrium chlorophyll-concentrations can also be calculated based on the empirical relationship between chlorophyll-a and total phosphorus developed by Harper and Baker (2007) specifically for Florida lakes:

$$ln\ (chyl\text{-}a) = 1.058\ ln\ TP - 0.934$$

$$R^2 = 0.815$$

where:

TP = mean total phosphorus concentration (µg/l)

The model estimates mean Secchi disk depth based upon the empirical relationship proposed by Harper and Baker (2007), also developed specifically for Florida lakes, which results in an estimated Secchi disk depth in meters, based upon chlorophyll-a input in units of mg/m^3:

$$SD = \frac{[24.2386 + 0.3041 * chyl\text{-}a]}{(6.0632 + chyl\text{-}a)}$$

$$R^2 = 0.807$$

where:

SD = Secchi disk depth (m)

chyl-a = chlorophyll-a concentration (mg/m^3)

Trophic State Index (TSI) values are calculated based upon predicted concentrations of chlorophyll-a. The empirical equation for calculating the Trophic State Index is:

$$TSI = 16.8 + 14.4 \ln (Chyl\text{-}a) \qquad (Chyl\text{-}a \text{ in } mg/m^3)$$

Average trophic state values less than 50 indicate oligotrophic conditions, values between 50 and 60 indicate mesotrophic conditions, and values from 61 to 70 indicate eutrophic conditions. Values over 70 represent hypereutrophic conditions.

6.2 Model Calibration

An interlinked mass balance model was developed for Lake Yale and Trout Lake on an average annual basis using monthly time steps. The model includes hydrologic inputs to the lakes from direct precipitation, stormwater runoff, overland flow, groundwater seepage, and flow between interconnected lakes (if present). Nutrient inputs to the lobes include estimated loadings from bulk precipitation, stormwater runoff, overland flow, groundwater seepage, flow between interconnected lakes (if present), and internal recycling.

Hydrologic and mass losses from the lakes are assumed to occur as a result of evaporation, deep recharge, irrigation withdrawal (if present), and discharges from the lakes to downstream waterbodies. The net hydrologic inputs into the lobes are used to provide an estimate of mean detention time, which is utilized in calculation of the phosphorus retention coefficient, and the equilibrium water column concentration of total phosphorus. Phosphorus inputs to the lobes are used to generate estimates of the areal phosphorus loading rates and the final in-lake phosphorus concentrations. Estimates of equilibrium chlorophyll-a concentrations and Secchi disk depth in the lobes are calculated based upon the predicted in-lake phosphorus concentration.

The developed hydrologic and mass balance models can be generalized as follows:

Hydrologic Budget:

Precipitation + Runoff + Overland Flow + Groundwater Seepage =

Evaporation + Withdrawal (if applicable) + Deep Recharge + Outflow Losses

Phosphorus Budget:

Bulk Precipitation + Runoff + Overland Flow + Groundwater Seepage + Internal Recycling =

Withdrawal (if applicable) + Deep Recharge + Outflow Losses (if applicable)

The Vollenweider model assumes that the lake behaves like a continuously stirred tank reactor (CSTR), and the modeled in-lake phosphorus concentration reflects the weighted phosphorus concentration within the water column of the lake. No significant differences in water quality characteristics were noted between the individual monitoring sites in the two lakes with the exception of the wetland pocket on the east side of Lake Yale which has limited hydrologic connection with other areas of the lake. As discussed in Section 2, both lakes appear to be well mixed, with little indication of stratification within the water depths present at the surface water monitoring sites. Therefore, the total phosphorus concentration predicted by the Vollenweider model can be compared with the results of the surface water monitoring program conducted within the two lakes.

6.2.1 Lake Yale

A comparison of measured and model predicted trophic state variables in Lake Yale is given in Table 6-1. The measured and model predicted values for total phosphorus and chlorophyll-a in Lake Yale are identical since the model is calibrated using the phosphorus sedimentation coefficient to be equal to the historical value. The model also predicts chlorophyll-a well with a difference of 2% between the modeled and measured values.

TABLE 6-1

COMPARISON OF MEASURED AND MODEL PREDICTED TROPHIC STATE VARIABLES IN LAKE YALE

PARAMETER	UNITS	MEAN MEASURED VALUE (2005-2015)	MODEL PREDICTED VALUE	PERCENT DIFFERENCE (%)
Total Phosphorus	μg/l	28	28	0
Chlorophyll-a	mg/m^3	21	21.2	-2
Secchi Disk	m	0.76	0.61	-20

Based upon the comparison summarized in Table 6-1, it appears that the calibrated water quality model for Lake Yale provides close agreement with measured trophic state variables based on recent historical water quality data. The calibrated water quality model is then used to predict anticipated water quality responses to evaluated phosphorus reduction strategies discussed in Section 7. A copy of the calibrated water quality model is given in Appendix K.1.

6.2.2 Trout Lake

A comparison of measured and model predicted trophic state variables in Trout Lake is given in Table 6-2. The measured and model predicted values for total phosphorus in Trout Lake are virtually identical with a historical concentration of 218 μg/l and a modeled concentration of 216 μg/l. A relatively close agreement was also obtained for chlorophyll-a, with a mean historical concentration of 55.4 mg/m^3 and a modeled concentration of 57.6 mg/m^3. Predicted and measured Secchi disk depths were also close in value, with a mean historical value of 0.66 m and a model predicted value of 0.60 m.

TABLE 6-2

COMPARISON OF MEASURED AND MODEL PREDICTED TROPHIC STATE VARIABLES IN TROUT LAKE

PARAMETER	UNITS	MEAN MEASURED VALUE (2005-2015)	MODEL PREDICTED VALUE	PERCENT DIFFERENCE (%)
Total Phosphorus	μg/l	218	216	-1
Chlorophyll-a	mg/m^3	55.4	57.6	+4
Secchi Disk	m	0.66	0.60	-9

Based upon the comparison summarized in Table 6-2, it appears that the calibrated water quality model for Trout Lake provides close agreement with measured trophic state variables based on recent historical water quality data. The calibrated water quality model is then used to predict anticipated water quality responses to evaluated phosphorus reduction strategies discussed in Section 7. A copy of the calibrated water quality model is given in Appendix K.2.

SECTION 7

EVALUATION OF WATER QUALITY IMPROVEMENT OPTIONS

A discussion of water quality maintenance and improvement options for Lake Yale and Trout Lake is presented in this section. The evaluated water quality improvement options are designed to target sources which have been identified as significant contributors of nutrient loadings to each lake. Phosphorus inputs to Lake Yale and Trout Lake occur through a wide variety of sources, including bulk precipitation, stormwater runoff, overland flow, groundwater seepage, and internal recycling, and the management plan is based upon identifying and treating the most significant treatable sources. The evaluated options include both structural and non-structural approaches to controlling and reducing pollutant inputs. A discussion of general management philosophy and recommended water quality improvement projects is given in the following sections.

7.1 Management Philosophy

7.1.1 Lake Yale

Prior to the early 1990s, Lake Yale was characterized by moderate levels of total nitrogen and relatively low levels of both total phosphorus and chlorophyll-a. Mean annual Secchi disk depths over this period ranged from approximately 1.2-3 m, and the lake generally exhibited oligotrophic, low color, conditions. Both anecdotal accounts and documented reports indicate that Lake Yale contained an impressive assemblage of emergent and submerged vegetation, and the lake was renowned as a fishing destination. The bottom of the lake consisted primarily of fine sand with minimal accumulations of organic muck. The watershed at that time consisted primarily of natural wetlands and agricultural activities, mostly tree crops, with little significant development.

During the mid-1970s, hydrilla began to appear in Lake Yale, and by the mid-1980s hydrilla had expanded to virtually all areas of the lake, topping out at the water surface over more than 50% of the lake area. During 1984, the Florida Game and Freshwater Fish Commission (FGFFC) conducted a chemical application for treatment of hydrilla which virtually eliminated hydrilla from the lake, but by 1990, the hydrilla infestation had returned to approximately 50% of the lake area. During 1987, FGFFC introduced more than 20,000 grass carp into Lake Yale, equivalent to a stocking rate of approximately 5 fish/acre, more than twice the current recommended rate. In addition, herbicide applications of Sonar were conducted on multiple occasions during the early-1990s. The combination of grass carp and repeated herbicide applications eliminated virtually all of the bottom rooted vegetation within the lake and left an accumulation of organic muck from the dead plant material as well as excretions from grass carp consuming the bottom vegetation.

During the mid- to late-1990s, Lake Yale exhibited a significant trophic state shift, with substantial and sudden increases in water column concentrations of total nitrogen, total phosphorus, and chlorophyll-a, and a subsequent decrease in Secchi disk depth, as Lake Yale transitioned from a clear plant-dominated system to a turbid plankton-dominated system. The resulting increase in algal productivity reduced water column clarity and opportunities for re-growth of submerged aquatic vegetation, and deposits of organic muck began to rapidly accumulate on the lake bottom. No evidence of rooted submerged vegetation was observed in central portions of Lake Yale by ERD during the entire 16-month field monitoring program.

In recent years, Lake Yale has experienced a gradual increase in floating tussocks in the southeast portion of the lake which flourish in the elevated nutrient conditions which occur in Lake Yale under present conditions. A combination of mechanical and chemical control methods have been used to remove these floating islands.

A TMDL for total phosphorus in Lake Yale was developed by FDEP and approved on September 19, 2003. The TMDL only considered inputs from stormwater runoff and bulk precipitation and estimated that these two sources contribute 1,432 kg/yr of total phosphorus to Lake Yale. The nutrient budget conducted by ERD includes phosphorus loadings from bulk precipitation, runoff, overland flow, groundwater seepage, and internal recycling. A comparison of estimated TMDL and ERD calculated loadings of total phosphorus to Lake Yale is given in Table 7-1. The sum of bulk precipitation and runoff in the ERD annual mass budget is 1,758 kg/yr which is relatively similar to the estimated loading of 1,432 kg/yr for runoff and bulk precipitation estimated by FDEP. However, the TMDL document fails to recognize and quantify loadings to Lake Yale from groundwater seepage and internal recycling, which together contribute an additional 8,130 kg/yr to Lake Yale.

TABLE 7-1

COMPARISON OF ESTIMATED TMDL AND ERD CALCULATED LOADINGS OF TOTAL PHOSPHORUS TO LAKE YALE

SOURCE	ANNUAL TOTAL PHOSPHORUS LOAD (kg/yr)	
	TMDL	ERD
Bulk Precipitation	1432	1249
Runoff + Overland Flow	(combined)	509
Groundwater Seepage	Not Included	149
Internal Recycling	Not Included	7,981
TOTAL:	**1,432**	**9,888**

The TMDL document recommends a 10% reduction from the estimated combined total phosphorus loading of 1,432 kg/yr, equivalent to 143 kg/yr. The estimated load reduction of 143 kg/yr for total phosphorus recommended by FDEP only reflects approximately 1.4% of the total phosphorus loading to Lake Yale identified by ERD. Even elimination of the entire runoff component to Lake Yale identified in the ERD phosphorus budget would only result in a total phosphorus reduction of approximately 5% which would have negligible impact on water quality within the lake. Bulk precipitation contributes approximately 13% of the annual phosphorus loadings, more than 2.5 times the loading contributed by runoff, but this input cannot be easily controlled. The combined inputs from groundwater seepage and internal recycling, both of which originate or migrate through the bottom sediments, contribute 82% of the annual phosphorus loading, and this internal loading must be addressed to produce any significant improvements in water quality in Lake Yale.

As discussed in Section 2.3.2, Lake Yale is considered to be a phosphorus-limited lake based upon the calculated TN/TP ratios summarized in Figure 2-44. However, TN/TP ratios predict nutrients necessary for additional stimulation of algal productivity and were never intended to reflect nutrient reductions necessary to reduce algal productivity. In general, eutrophic lakes can only be improved by reducing inputs of phosphorus to the lake, since cyanobacteria (which are common in virtually all eutrophic lakes) can easily make up any observed nitrogen deficiency through nitrogen fixation which provides a virtually limitless nitrogen supply to the algae. Therefore, the primary objective of the water quality management plan for Lake Yale is to control inputs of total phosphorus which will also result in an incidental reduction in total nitrogen.

7.1.2 Trout Lake

Unlike Lake Yale, Trout Lake is a highly-colored eutrophic waterbody which has maintained elevated levels of both total nitrogen and total phosphorus throughout the period of available historical data which begins in 1993. Approximately half of the surface area of Trout Lake appears to be hydrologically connected with hardwood wetlands which likely account for the substantially elevated color observed within the lake. Measured concentrations of total phosphorus in Trout Lake generally range from approximately 100->600 μg/l, with values rarely falling below 100 μg/l. Measured total nitrogen concentrations range from approximately 1,000->5,000 μg/l, with values rarely less than 1,500 μg/l. The lake is characterized by elevated but highly variable concentrations of chlorophyll-a and extremely poor water clarity due to the combination of color and algal mass. Over the period from 1993-2015, Trout Lake exhibited primarily eutrophic characteristics, although oligotrophic and mesotrophic characteristics have been observed at times.

Unlike Lake Yale, Trout Lake receives significant phosphorus loadings from multiple sources, including stormwater runoff (40%), groundwater seepage (21%), and internal recycling (33%), with minimal contributions by bulk precipitation and overland flow. A TMDL for Trout Lake was developed by FDEP and adopted on January 4, 2006. The TMDL included nutrient loadings from runoff, bulk precipitation, and failed septic tanks, with an annual estimated nitrogen loading of 10,959 kg/yr and 1,181 kg/yr for total phosphorus from these sources. The most significant loading source identified in the TMDL was stormwater runoff which contributed 98% of the annual nitrogen load and 97% of the annual phosphorus load. The TMDL document also estimated an annual inflow of 6,700 ac-ft/yr to Trout Lake from stormwater runoff.

The hydrologic and nutrient budgets developed by ERD for Trout Lake indicate an annual nitrogen loading of 5,368 kg/yr of total nitrogen from the combined inputs of bulk precipitation, stormwater runoff, overland flow, groundwater seepage, and internal recycling which is approximately half of the estimated annual TMDL loading from runoff alone. A comparison of TMDL and calculated ERD mass loadings of total nitrogen and total phosphorus is given on Table 7-2. The total phosphorus budget developed by ERD estimates a total phosphorus loading of 527 kg/yr which is less than half of the estimated TMDL loading from stormwater alone. The primary reason for this discrepancy appears to be the substantially lower runoff volume of 1,762 ac-ft/yr estimated by ERD compared with 6,708 ac-aft/yr indicated in the TMDL document. It appears that the TMDL calculations used standard runoff coefficients for land use categories within the drainage basin and failed to consider the significant internal storage within the large basin area. In the ERD analysis, runoff inputs reflect 50% of the annual loadings of total nitrogen and 40% of the annual loadings of total phosphorus, compared with 98% and 97%, respectively, for total nitrogen and total phosphorus proposed in the TMDL. The recommended TMDL load reductions of 4,414 kg/yr for runoff generated loadings of total nitrogen and 236 kg/yr for runoff generated loadings of total phosphorus exceed the overall total runoff inputs for nitrogen and phosphorus calculated by ERD and presented in Section 5.

TABLE 7-2

COMPARISON OF ESTIMATED TMDL AND CALCULATED ERD LOADINGS OF TOTAL NITROGEN AND TOTAL PHOSPHORUS TO TROUT LAKE

SOURCE	ANNUAL TOTAL NITROGEN LOAD (kg/yr)		ANNUAL TOTAL PHOSPHORUS LOAD (kg/yr)	
	TMDL	ERD	TMDL	ERD
Bulk Precipitation	50	418	25	33
Runoff + Overland Flow	10,734	2,722	1,141	214
Groundwater Seepage	176[1]	644	14.5	108
Internal Recycling	Not Included	1,585	Not Included	172
TOTAL:	**10,959**	**5,368**	**1,180**	**527**

1. Includes only “failed” septic tanks

Based upon the surface water field monitoring conducted by ERD, Trout Lake contains abundant levels of inorganic forms of both nitrogen and phosphorus which are available for stimulation of additional algal productivity. Therefore, it appears that algal productivity in Trout Lake is regulated by factors other than availability of nutrients. As indicated on Figure 2-38, a strong correlation exists in Trout Lake between water color levels and algal productivity, with rapidly decreasing concentrations of chlorophyll-a with increasing color values. These data suggest that algal productivity in Trout Lake is regulated more by light limitation due to the high color within the water than a result of nutrient availability. In developing water quality improvement strategies for Trout Lake, it must be considered that management options which result in a significant reduction in color within Trout Lake may actually increase algal productivity unless substantial reductions in nutrient concentrations and loadings also occur.

Similar to the discussion previously provided for Lake Yale, reduction in algal productivity in Trout Lake, ignoring the impacts of color, can only be achieved by reducing loadings and concentrations of total phosphorus. Deficiencies in nitrogen in Trout Lake can easily be eliminated by cyanobacteria with nitrogen fixation capabilities, so nutrient limitation must be achieved through total phosphorus rather than total nitrogen. Phosphorus loadings to Trout Lake originate from three significant sources, including runoff, groundwater seepage, and internal recycling, and each of these should be addressed to achieve maximum improvements in water quality within Trout Lake.

7.2 Stormwater Runoff

Based upon the annual mass budgets for Lake Yale and Trout Lake, provided in Section 5.3, stormwater runoff contributes approximately 5% of the annual phosphorus loading to Lake Yale and 40% of the annual phosphorus loading to Trout Lake. A discussion of potential stormwater management options for the two lakes is given in the following sections.

7.2.1 Lake Yale

Based upon the calculated mean annual phosphorus budget for Lake Yale (summarized in Table 5-22), stormwater runoff contributes approximately 507 kg/yr out of the total loading of 9,888 kg/yr discharging to Lake Yale. The contribution of total phosphorus from runoff to Lake Yale is less than half of the phosphorus loading contributed by bulk precipitation. Therefore, management of stormwater runoff is a less significant component of an overall water quality management and improvement plan for Lake Yale and should only be undertaken if a large volume of runoff can be treated inexpensively. A summary of significant sub-basin areas discharging to Lake Yale, defined as sub-basins which contribute 5% or more of the runoff generated phosphorus loadings, is given in Table 7-3.

7.2.1.1 Lake Yale Wetland

The largest significant sub-basin area is the Lake Yale Wetland which has a surface area of 4,062 acres and contributes approximately 53.4 kg/yr of total phosphorus to Lake Yale, equivalent to 0.5% of the total annual phosphorus load. Land use within this drainage basin consists primarily of wetlands, water, and agricultural activities, along with upland forests and residential homes. Water movement within this sub-basin consists primarily of diffuse overland flow through wet prairies and hardwood wetlands, with no practical method of accumulating runoff for treatment. Stormwater treatment projects in upstream portions of this drainage basin would be largely ineffective since the discharges would migrate through the wetland areas and reach equilibrium wetland water quality characteristics which may reduce the benefits of the upstream BMPs. Therefore, stormwater treatment is not recommended for this sub-basin area.

7.2.1.2 Sub-basin LYD 11-01

Sub-basin LYD 11-01 is a 639.5 acre drainage basin located on the east side of Lake Yale. The sub-basin area consists of a combination of agricultural and wetland areas which are connected using a series of farm canals and ditches. The discharge to Lake Yale occurs through a single shallow canal which is ideal for implementing a BMP. However, this sub-basin only contributes 8.9% of the runoff generated phosphorus loading to Lake Yale and only 0.4% of the total overall phosphorus loading to the lake. Construction of a stormwater BMP for this basin would have little impact on water quality in Lake Yale, and BMP implementation for this sub-basin is not recommended at this time. In addition, the land adjacent to Lake Yale is currently in private ownership, and land purchase would be required for a treatment BMP.

TABLE 7-3

SUMMARY OF SIGNIFICANT SUB-BASIN AREAS DISCHARGING TO LAKE YALE

SUB-BASIN	BASIN AREA (acres)	ANNUAL TP LOAD (kg/yr)	PERCENT OF ANNUAL TP LOAD (%)	RETROFIT FEASIBILITY	EXPLANATION
Lake Yale Wetland (LYW 01-01)	4,062	53.4	10.5 (0.5% of TP load to lake)	Low	This sub-basin consists of diffuse overland flow through a hardwood wetland with no practical method of accumulating runoff for treatment. Upstream projects would not be effective due to the water quality equilibrium which is achieved in the wetland.
LYD 11-01	639.5	45.1	8.9 (0.4% of TP load to lake)	Low	This sub-basin consists of agricultural and wetland areas connected with a series of farm canals and ditches. Discharge to Lake Yale occurs through a single shallow canal. Land is available for a BMP near the lake, but the land is in private ownership.
LYD 12-01	399.7	30.8	6.1 (0.3% of TP load to lake)	Moderate	This sub-basin consists primarily of agriculture with a small area of residential use. Drainage is collected in a series of farm ditches which become navigable channels in the residential area. Runoff from this area had elevated TP concentrations. Runoff could be diverted to an adjacent sub-basin for treatment.
LYD 13-01	757.1	97.8	19.2 (1.0% of TP load to lake)	Moderate	This sub-basin consists of a combination of agriculture, wetlands, and residential land uses. Drainage is collected in a series of farm ditches which become navigable channels in the residential areas. Opportunity to combine treatment with an existing system south of the sub-basin.
LYD 14-01	97.0	146.8	28.8 (1.5% of TP load to lake)	Unknown	This relatively small sub-basin has a high TP loading due to a runoff sample that indicated an extremely highly TP concentration. The source of this elevated TP concentration should be investigated and identified, and remedial action taken, if necessary.

7.2.1.3 Sub-basins LYD 12-01 and 13-01

Sub-basins LYD 12-01 and 13-01 are adjacent sub-basins located on the southeast portion of Lake Yale. Each of the sub-basin areas consists of a mixture of agriculture, wetlands, and residential land uses, and drainage is collected in a series of farm ditches which become navigable channels in the residential areas.

Combined together, Sub-basins LYD 12-01 and 13-01 have an area of approximately 1,157 acres and contribute approximately 128.6 kg/yr of total phosphorus to Lake Yale. This loading is equivalent to approximately 25.3% of the annual runoff generated phosphorus loading to Lake Yale and 1.3% of the overall total phosphorus load to the lake. During the field monitoring program, elevated concentrations of total phosphorus were observed in the discharges from both sub-basins.

Each of the two sub-basins discharges into the southeast portion of Lake Yale through a series of navigable canals, and the contributed loadings primarily impact water quality characteristics in the southeast portion of Lake Yale. Although the observed phosphorus loadings from these sub-basins are low in comparison to the overall loadings to Lake Yale, the runoff phosphorus loadings reflect a significant contribution to the relatively small southeast lobe of Lake Yale, and elevated nutrient concentrations resulting from these inflows may be partially responsible for stimulating the observed growth of tussocks in this portion of the lake. Therefore, a stormwater BMP for these two sub-basins may be economically feasible provided that the construction cost is not prohibitive.

A conceptual design for a stormwater treatment system for Sub-basins LYD 12-01 and 13-01 is given on Figure 7-1. The system is designed to intercept runoff generated in upstream portions of Sub-basin LYD 12-01 and 13-01 and direct the combined inflows into an expanded version of an existing wet detention pond for treatment prior to discharging the treated water back into a canal discharging to Lake Yale.

Under existing conditions, runoff generated in upstream portions of Sub-basin LYD 12-01 passes beneath Coyote Pass through a stormsewer culvert with multiple surface inlets to collect adjacent surface drainage. The conceptual design proposes to construct a diversion weir inside one of the existing inlet structures and divert the water south through a new 24-inch RCP and into an existing canal system associated with Sub-basin LYD 13-01.

The existing canal currently passes beneath Yale Retreat Road through a stormsewer culvert. A diversion weir is proposed upstream of the crossing with Yale Retreat Road to divert the water within the existing canal, consisting of diverted runoff from Sub-basin LYD 12-01 along with runoff generated within Sub-basin LYD 13-01, into an expanded version of an existing wet detention pond associated with a mobile home community located on the east side of Yale Retreat Road. The proposed pond expansion is shown on Figure 7-1 to include areas north of the pond, although the pond expansion could also occur to the east depending on future development plans for the site. An outfall structure will be constructed for the expanded pond which will carry the treated water back to the Lake Yale Canal near the existing County park and boat ramp facility. The expanded wet detention pond will provide treatment for both the existing mobile home community as well as diverted runoff from Sub-basins LYD 12-01 and 13-01. This relatively simple concept makes maximum use of existing infrastructure to convey the runoff to minimize the BMP cost due to the relatively low phosphorus loading originating within this area. If expansion of the existing private pond is not feasible, the same type of system could be used to divert water from the two sub-basins into a new pond facility located on the County Park parcel which could be designed as an amenity.

A conceptual cost estimate for the proposed enhanced pond system is given in Table 7-4. Pipe sizes are included on Table 7-4 for cost purposes based upon previous experience with similar projects. However, specific pipe sizes would need to be determined based upon hydrologic modeling during the evaluation and design phase. Conceptual costs estimates are provided for mobilization, clearing and grubbing, excavation, and miscellaneous stormsewer pipes, headwalls, and structures. This analysis does not include any potential costs associated with land purchase, since the size and location of land requirements is not known at this time. The estimated conceptual construction cost for the Sub-basins LYD 12-01 and 13-01 stormwater treatment facility is approximately $659,285 which includes a 10% contingency.

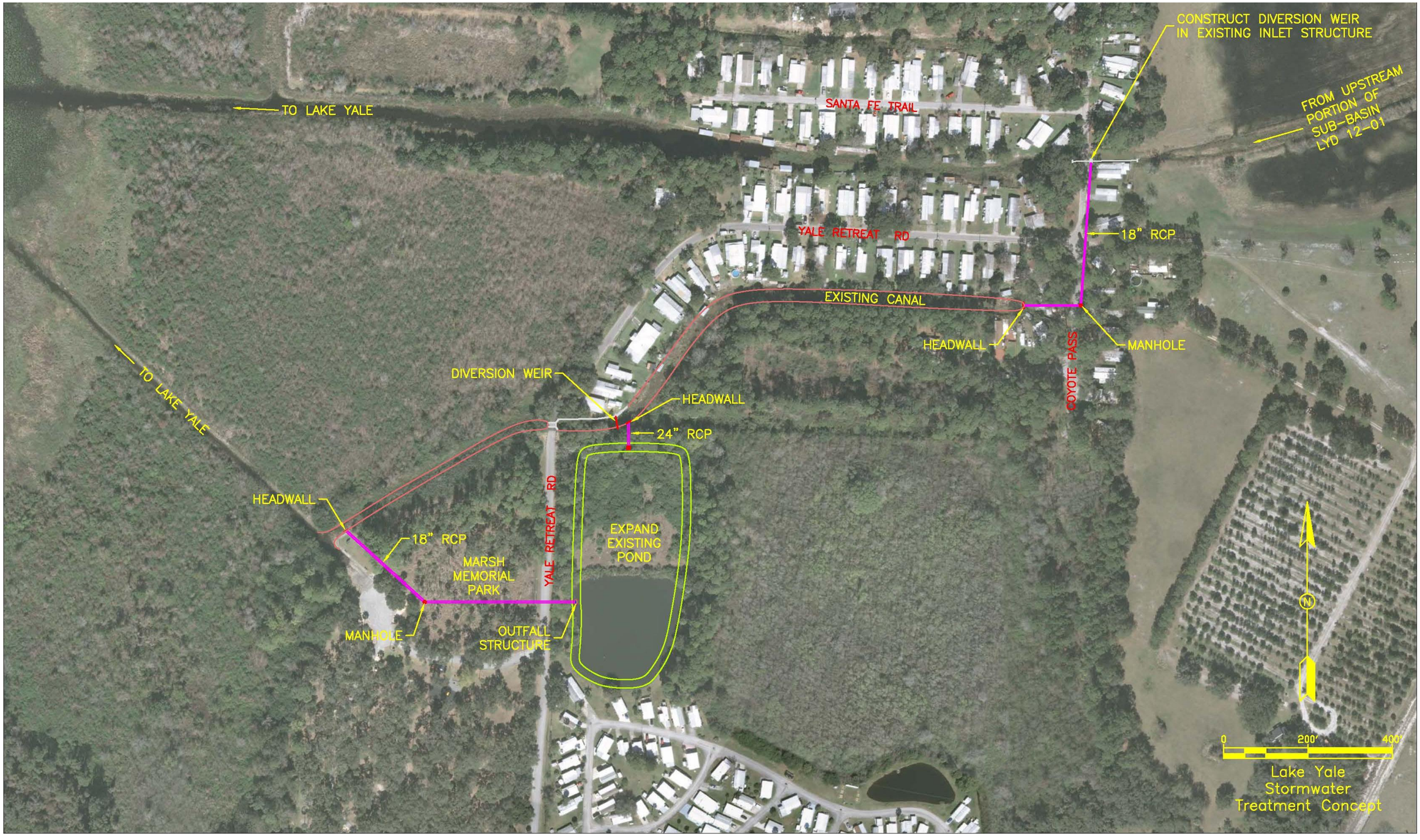


Figure 7-1. Conceptual Design for a Stormwater Treatment System for Sub-basins LYD 12-01 and 13-01.

TABLE 7-4

SUB-BASINS LYD 12-01 AND 13-01 STORMWATER TREATMENT FACILITY CONCEPTUAL COST ESTIMATE

FDOT NUMBER	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL COST ($)
--	Mobilization	1	LS	--	$ 60,000.00
0110 1 1	Clearing and Grubbing	2	AC	15,000.00	30,000.00
0120 2 2	Excavation (includes dewatering and removal)	25,550	CY	12.00	306,600.00
430174118	18" RCP	1,125	LF	75.00	84,375.00
430174124	24" RCP	75	LF	105.00	7,875.00
-	Low Head Weir - Sheet Piling with Concrete Cap	30	LF	600.00	18,000.00
0570 1 2	Sodding (includes watering)	6,950	SY	5.00	34,750.00
0425 2 41	Type P Manhole	3	EA	4,500.00	13,500.00
0425 1541	Outfall Structure - Type D	1	EA	5,500.00	5,500.00
430611025	Headwall	3	EA	5,000.00	15,000.00
0530 3 3	Riprap	10	TN	100.00	1,000.00
-	Weir inside manhole	1	EA	3,000.00	3,000.00
0104 12	Silt Fence	2,100	LF	5.00	10,500.00
-	Discharge Skimmer	1	LS	5,000.00	5,000.00
0104 11	Floating Turbidity Barriers	225	LF	10.00	2,250.00
430982129	MES - 24" RCP	1	LS	2,000.00	2,000.00
				Sub-total:	**$ 599,350.00**
				10% Contingency:	**$ 59,935.00**
				PROJECT TOTAL:	**$ 659,285.00**

Calculated present worth phosphorus removal costs for the Sub-basins LYD 12-01 and 13-01 stormwater BMP pond are provided in Table 7-5. This analysis assumes an initial construction cost of $659,285, with an annual O&M cost of approximately $20,000 for pond maintenance. The 20-year present worth cost for the project, based upon an interest rate of 2.5%, is approximately $971,065. The current estimated annual phosphorus loading to Lake Yale from Sub-basins LYD 12-01 and 13-01 is approximately 128.6 kg/yr, and over the 20-year period of analysis, Sub-basins 12 and 13 will contribute approximately 2,572 kg of total phosphorus to Lake Yale. The proposed wet detention pond will remove approximately 65% of the annual phosphorus loadings originated in Sub-basins 12 and 13. Over the 20-year period of analysis, the pond will remove approximately 1,672 kg of total phosphorus which corresponds to a total removal cost of approximately $581/kg. This removal cost is comparable to phosphorus removal costs commonly observed in wet detention ponds and is a relatively attractive phosphorus removal cost, especially in comparison with BMPs such as gross pollutant separators which can often exceed a phosphorus removal cost of $10,000/kg.

TABLE 7-5

CALCULATED PRESENT WORTH PHOSPHORUS REMOVAL COSTS FOR THE SUB-BASINS LYD 12-01 AND 13-01 STORMWATER BMP

PARAMETER	UNITS	VALUE
Construction Cost	$	659,285
Annual O&M	$	20,000
Present Worth Cost (n = 20 years, i = 2.5%)	$	971,065
Annual Total Phosphorus load for Sub-basins 12 and 13	kg/yr	128.6
Assumed Pond Total Phosphorus Removal	%	65
Total Phosphorus Load Reduction (20 years)	kg	1,672
Total Phosphorus Removal Cost	$/kg	581

7.2.1.4 Sub-basin LYD 14-01

Sub-basin LYD 14-01 is located on the southeast portion of Lake Yale. This sub-basin was included in the field monitoring conducted by ERD as part of this project, and an extremely elevated total phosphorus concentration of 8,305 μg/l, with 1,780 μg/l SRP, was measured in runoff discharging from this sub-basin. Only one runoff sample was collected at this site during the field monitoring program, indicating that discharges from this sub-basin occur on an infrequent basis, although when discharges do occur, they appear to contain elevated phosphorus concentrations.

Sub-basin LYD 14-01 consists primarily of runoff generated within the Eustis Commerce Park, with the two most significant tenants in the commerce park consisting of US Nutraceutical and Florida Food Products, each of which has large facilities covering multiple acres.

Before a stormwater BMP can be recommended for this sub-basin, the source of the elevated total phosphorus concentration should be investigated and identified. It is not known at this time if the elevated phosphorus is a single occurrence or a recurring condition throughout the year. Therefore, ERD recommends that a source identification project be conducted within this sub-basin to identify the source of the elevated phosphorus concentrations and evaluate the feasibility of source controls prior to recommendations for implementation of a stormwater BMP.

7.2.2 Trout Lake

A summary of significant sub-basin areas discharging to Trout Lake is given in Table 7-6. Only three significant sub-basins were identified in the Trout Lake drainage basin which contribute 5% or more of the annual runoff generated phosphorus loadings to the lake. A discussion of potential stormwater BMP projects for significant Trout Lake sub-basins is given in the following sections.

TABLE 7-6

SUMMARY OF SIGNIFICANT SUB-BASIN AREAS DISCHARGING TO TROUT LAKE

SUB-BASIN	BASIN AREA (acres)	ANNUAL TP LOAD (kg/yr)	PERCENT OF ANNUAL TP LOAD (%)	RETROFIT FEASIBILITY	EXPLANATION
Hicks Ditch	7,579	156.5	73.2 (29.7% of TP load to lake)	In Progress	This sub-basin consists of diffuse overland flow from agricultural and wetland areas. A state funded project is currently underway to provide chemical treatment for this sub-basin near CR 44, with the treated water pumped to Trout Lake and bypassing the Trout Lake wetland area.
Trout Lake Wetland	1,102	20.9	9.8 (4.0% of TP load to lake)	Low	This sub-basin consists of large hardwood wetland areas that discharge to Trout Lake through diffuse overland flow with no practical method of accumulating runoff for treatment. Treatment systems in upstream portions of the sub-basin would be degraded during travel through the wetland.
TL 07-01	511	25.0	11.7 (4.7% of TP load to lake)	Low	This sub-basin consists of a combination of wetlands and residential land uses. Drainage is collected in a series of swales which discharge into the adjacent wetlands or canals. No feasible opportunities for BMP projects.

7.2.2.1 Hicks Ditch

Hicks Ditch is the largest single sub-basin area discharging to Trout Lake. The sub-basin has an approximate surface area of 7,579 acres and an estimated annual phosphorus load to Trout Lake of 156.5 kg/yr, equivalent to 73.2% of the annual runoff generated phosphorus loading to the lake and 29.7% of the overall phosphorus load to Trout Lake. Because of the significance of this sub-basin with respect to both phosphorus loading and overall annual loading, the Hicks Ditch drainage basin provides the single largest opportunity for reducing phosphorus loadings to Trout Lake from stormwater runoff.

According to LCWA, an alum-based chemical treatment system is currently being constructed to reduce phosphorus loadings from Hicks Ditch discharging to Trout Lake. The treatment system will be constructed upstream of CR 44 and will provide treatment for Hicks Ditch prior to discharge into the Trout Lake wetland area. However, rather than discharging the treated water into the wetland, the system will introduce the treated water directly into Trout Lake, bypassing the wetland system altogether. This diversion piping will substantially enhance the effectiveness of the chemical treatment system, since water quality degradation would have certainly occurred for the treated water during movement through the large wetland area.

A summary of estimated load reductions for the Hicks Ditch alum treatment system is given in Table 7-7. For this analysis, the system is estimated to provide a 75% reduction in phosphorus loadings for discharges through Hicks Ditch. Generally, alum chemical treatment systems typically provide removal efficiencies of approximately 85-95%, but the removal efficiency is reduced to 75% due to the high color within the Hicks Ditch water which reduces the effectiveness of the chemical treatment system. Based upon the assumed 75% reduction, the alum chemical treatment system is expected to remove approximately 117 kg/yr of total phosphorus from Trout Lake.

TABLE 7-7

ESTIMATED TOTAL PHOSPHORUS LOAD REDUCTIONS FOR THE HICKS DITCH ALUM TREATMENT SYSTEM

PARAMETER	UNITS	VALUE
Runoff Total Phosphorus Load	kg/yr	156.5
Removal by Alum System	%	75
Annual Total Phosphorus Load Reduction	kg/yr	117.4

As discussed in Section 7.1.2, algal productivity in Trout Lake is thought to be limited currently by water color rather than nutrients since both phosphorus and nitrogen are currently abundant. In addition to removing phosphorus, the proposed alum treatment system will also provide a substantial reduction in color within the treated water. Discharge of this water into Trout Lake will likely result in a decrease in color which may actually result in an increase in algal productivity unless SRP concentrations within the lake are reduced to values which limit algal growth. The combined phosphorus inputs from groundwater seepage and internal recycling to Trout Lake comprise approximately 54% of the overall annual loadings, and these inputs must also be addressed to ensure phosphorus limitation within the lake and to reduce the potential for stimulation of algal productivity by color reduction caused by the alum stormwater treatment system.

7.2.2.2 Trout Lake Wetland

The Trout Lake wetland sub-basin is a 1,102 acre area located on the east and north sides of Trout Lake. This sub-basin consists primarily of hardwood wetlands that discharge to Trout Lake through diffuse overland flow and contribute approximately 20.9 kg/yr of total phosphorus to Trout Lake. The phosphorus contribution from the Trout Lake Wetland reflects approximately 9.8% of the annual runoff generated phosphorus loadings to Trout Lake and 4% of the overall phosphorus loadings to the lake.

Unfortunately, due to the diffuse overland flow characteristics of this wetland, there appears to be no practical method of accumulating the runoff in a centralized location for treatment. Installation of treatment systems in upstream portions of the sub-basin would not be beneficial since the treated runoff would be degraded during travel through the wetland areas prior to reaching Trout Lake. Since this sub-basin is primarily natural in character, no BMP projects are recommended for this sub-basin at this time.

7.2.2.3 Sub-basin TL 07-01

Trout Lake sub-basin TL 07-01 is located on the south side of Trout Lake and discharges into the lake through a navigable canal. This 511 acre sub-basin contributes a total of 25.0 kg/yr of total phosphorus to Trout Lake, and contributes 11.7% of the runoff generated phosphorus loading to Trout Lake and 4.7% of the overall annual phosphorus loading. This sub-basin also consists of a combination of wetlands and residential land uses where drainage is collected in a series of swales that discharge into the adjacent wetlands or canals. No currently feasible opportunities appear to exist for BMP projects in this sub-basin, and due to the relatively small overall phosphorus loading generated within this loading, no structural BMPs are proposed at this time.

7.3 Management of Internal Loadings

Options for management of internal loadings in Lake Yale and Trout Lake are discussed in this section. Management of internal loadings can be achieved by physical removal of the sediments, reducing the source for internal loadings, or by chemical inactivation of the available phosphorus within the sediments, making it unavailable for release into the overlying water column. A discussion of the significance of internal loadings and methods for sediment removal and inactivation in the two lakes is given in the following sections.

7.3.1 Significance of Internal Loadings

7.3.1.1 Lake Yale

As discussed in Section 5.1.4, phosphorus inputs into Lake Yale from internal recycling contribute approximately 7,981 kg/yr of phosphorus to the lake which is equivalent to approximately 80% of the annual overall phosphorus loading. Internal recycling was measured directly by ERD using a series of incubation experiments conducted on large diameter core samples collected from the lake. These experiments indicated that the existing sediments within the lake exhibit an overall phosphorus release rate of approximately 2.15 mg/m^2-day under anoxic conditions and 0.40 mg/m^2-day under aerobic conditions. Each of these values is elevated compared with phosphorus release rates measured by ERD in other Florida lakes.

As discussed in Section 2, estimates of the existing accumulations of organic muck in Lake Yale were generated by ERD during the field monitoring program, and a muck depth contour map of the lake was provided in Figure 2-6. Based upon this analysis, Lake Yale contains approximately 20,725 ac-ft (33,436,333 yd^3) of unconsolidated organic sediments. The volume of unconsolidated sediments in Lake Yale is sufficient to cover the entire lake bottom to a depth of approximately 5.2 ft, a value substantially greater than commonly observed by ERD in Central Florida lakes, and one of the deepest overall mean muck accumulations ever measured by ERD.

In addition to the diffusive inputs of phosphorus from the sediments into the water column of Lake Yale, the lake also receives phosphorus loading as a result of groundwater seepage into the lake. The quantity and quality of groundwater seepage entering Lake Yale was measured directly by ERD during the period from June 2015-October 2016. Groundwater seepage inflow to Lake Yale was found to have relatively low levels of total phosphorus in most areas throughout the lake. The nutrient budget for Lake Yale, summarized in Table 5-22, indicates that groundwater seepage contributes approximately 149 kg/yr of total phosphorus to the lake, equivalent to approximately 2% of the annual phosphorus loading.

Based upon the field monitoring conducted by ERD, it is apparent that the existing sediment accumulations in Lake Yale contribute a significant phosphorus loading to the lake each year. Water quality within the lake could be improved substantially by reducing the observed phosphorus loadings from internal recycling and shallow groundwater seepage.

7.3.1.2 Trout Lake

As discussed in Section 5.1.4, phosphorus inputs into Trout Lake from internal recycling contribute approximately 172 kg/yr of total phosphorus to the lake, equivalent to approximately 33% of the annual overall phosphorus loading. Internal recycling was measured directly by ERD using a series of incubation experiments conducted in large diameter core samples collected from the lake. These experiments indicated that the existing sediments within Trout Lake exhibit a relatively large phosphorus release rate of approximately 1.13 mg/m^2-day under anoxic conditions and 0.81 mg/m^2-day under aerobic conditions.

As discussed in Section 2, estimates of existing accumulations of organic muck in Trout Lake were generated by ERD as part of this project, and a muck depth contour of the lake was provided in Figure 2-4. Overall, Trout Lake contains approximately 233 ac-ft (375,907 yd^3) of unconsolidated organic sediments. The volume of unconsolidated sediments in Trout Lake is sufficient to cover the entire lake bottom to a depth of approximately 2.2 ft, a value slightly higher than commonly observed by ERD in eutrophic Central Florida lakes.

In addition to the diffusive influx of phosphorus from the sediments, the lake also receives phosphorus loadings as a result of groundwater seepage. The quantity and quality of groundwater seepage entering Trout Lake was monitored directly by ERD during the period from June 2015-October 2016. Groundwater seepage inflow to Trout Lake was found to have low to elevated levels of total nitrogen and elevated levels of total phosphorus, with concentrations for total phosphorus substantially higher than measured by ERD in other urban lakes. Phosphorus loadings from groundwater seepage to Trout Lake are estimated to be approximately 109 kg/yr to the lake.

Based upon the field monitoring conducted by ERD, it is apparent that the existing sediment accumulations within Trout Lake contribute a significant phosphorus loading to the lake each year. Water quality in the lake could be improved substantially by reducing the internal phosphorus loadings.

7.3.2 Whole-Lake Dredging

One of the potential water quality management options for the existing sediment accumulations for Lake Yale and Trout Lake is a whole-lake dredging project which is designed to remove the existing organic muck, leaving the original parent bottom material of each lake. This option will eliminate much of the water quality impacts from the existing sediments, with added benefits of increasing water depth, water volume, and lake residence time. In general, increasing residence time within a waterbody increases the opportunity for biological uptake, resulting in better equilibrium water quality characteristics and lower nutrient loadings to downstream waterbodies.

A decision to remove accumulated lake bottom sediments generally occurs when there is sufficient evidence that the accumulated sediments are having an adverse impact on habitat, water quality, recreation, or navigation. The existing sediments in Lake Yale and Trout Lake do not appear to have a direct impact on recreation or navigation within the lakes, with the possible exception of the southeast portions of Lake Yale, although sediment disturbance by boating could become a problem at low water levels. However, field and laboratory work conducted by ERD has demonstrated an adverse impact of sediments on existing water quality in both Lake Yale and Trout Lake.

7.3.2.1 Dredging Methods

Sediment removal by dredging can be accomplished by either mechanical or hydraulic dredging methods. Mechanical dredging most frequently involves either partially or completely draining the lake to expose the sediments and decrease the water content. Conventional earth moving equipment, such as bulldozers, scrapers, backhoes, and draglines, are then used to remove the partially dewatered sediments. The sediment material is stockpiled on the shore and then hauled away in dump trucks to a disposal location. However, given the significant volume of water within Lake Yale and the large annual influx of water to Trout Lake, it is highly unlikely that even a relatively small portion of either lake could be dried enough to allow mechanical dredging to occur. Even if portions of the lakes were isolated using sheetpile, continuous seepage of groundwater inflow into the lakes would make adequate dewatering of these areas extremely difficult.

The most likely option for dredging in Lake Yale or Trout Lake would be hydraulic dredging. A hydraulic dredge excavates and pumps material from the lake bottom through a temporary HDPE pipeline to an off-site location which is often several thousand feet to several miles away. The head of the dredging unit is equipped with a rotating cutter which uses steel blades to dislodge the sediments, and a centrifugal pump is used to "suck up" the muck and water mixture, forming a slurry. Control of the dredging depth and location occurs by manipulation of the suction head in both a vertical and horizontal direction. Since lake water is removed along with the sediment, hydraulic dredging slurries are commonly 80-90% water. An advantage of hydraulic dredging is that it is generally faster than mechanical dredging and creates less turbidity in the dredged waterbody. Hydraulic dredging is often the most cost-effective method for large dredging projects. As a result, this analysis will assume that a potential dredging project for either Lake Yale or Trout Lake would be accomplished using a hydraulic dredge.

7.3.2.2 Containment Area Requirements

The dredged sediment material from the bottom of the lakes would be pumped to a disposal area where the sediments would be allowed to dewater over time. The disposal area must be sufficient in size to hold not only the dried dredged sediments, but also the large volume of pumped sediment/water slurry that occurs during the actual dredging process. When lake sediments are formed into a slurry by the dredge, the volume of the sediments tends to increase temporarily which is referred to as the "bulking factor". This additional volume must also be considered when designing the disposal basin. Bulking factors ranging from 1.2-1.5 are typical, with a factor of 1.5 assumed for Lake Yale and Trout Lake.

7.3.2.2.1 Lake Yale

A summary of dredging design assumptions and containment area requirements for Lake Yale is given on Table 7-8. As discussed previously, Lake Yale contains approximately 20,725 ac-ft of sediments which would be removed during the dredging process, equivalent to approximately 33,436,333 yd^3. Assuming a bulking factor of 1.5, the total volume of sediment/water slurry which must be contained within the containment area increases to 50,154,500 yd^3.

TABLE 7-8

SUMMARY OF DREDGING DESIGN ASSUMPTIONS AND CONTAINMENT AREA REQUIREMENTS FOR LAKE YALE

PARAMETER	UNITS	VALUE
Existing Sediment Volume	ac-ft yd^3	20,725 33,436,333
Assumed Bulking Factor	--	1.5
Containment Area Volume	ac-ft yd^3	31,088 50,154,500
Assumed Containment Area Depth, with 1 ft Freeboard	ft	5
Required Containment Area	acres	7,772
Disposal Site Area with 20% Buffer	acres	9,326

Containment areas are commonly located on relatively flat ground, with a berm constructed around the perimeter to contain the dredged slurry. To minimize stability issues associated with the containment berm, the depth of the dredged slurry is limited to 4 ft. An additional freeboard of approximately 1 ft would also be incorporated into the design to provide an average berm height of approximately 5 ft with a maximum slurry depth of 4 ft. Based upon these criteria, the required containment area for hydraulic dredging of Lake Yale would be approximately 7,772 acres. Assuming an additional 20% area for roadways and access to various portions of the containment area, the total required site area would be approximately 9,326 acres. This parcel would ideally be located close to Lake Yale, although remote locations can also be utilized at an increased unit cost. The containment area can also be spread out among multiple smaller parcels, but the unit costs may increase.

7.3.2.2.2 Trout Lake

A summary of dredging design assumptions and containment area requirements for Trout Lake is given on Table 7-9. As discussed previously, Trout Lake contains approximately 233 ac-ft of sediments which would be removed during the dredging process, equivalent to approximately 375,907 yd^3. Assuming a bulking factor of 1.5, the total volume of sediment/water slurry which must be contained within the containment area increases to 563,861 yd^3.

To minimize stability issues associated with the containment berm, the depth of the dredged slurry is limited to 4 ft. An additional freeboard of approximately 1 ft would also be incorporated into the design to provide an average berm height of approximately 5 ft with a maximum slurry depth of 4 ft. Based upon these criteria, the required containment area for hydraulic dredging of Trout Lake would be approximately 85 acres. Assuming an additional 20% area for roadways and access to various portions of the containment area, the total required site area would be approximately 102 acres. This parcel would ideally be located close to Trout Lake, although remote locations and multiple disposal properties can also be utilized at an increased unit cost.

TABLE 7-9

SUMMARY OF DREDGING DESIGN ASSUMPTIONS AND CONTAINMENT AREA REQUIREMENTS FOR TROUT LAKE

PARAMETER	UNITS	VALUE
Existing Sediment Volume	ac-ft yd^3	233 375,907
Assumed Bulking Factor	--	1.5
Containment Area Volume	ac-ft yd^3	340 563,861
Assumed Containment Area Depth, with 1 ft Freeboard	ft	5
Required Containment Area	acres	85
Disposal Site Area with 20% Buffer	acres	102

7.3.2.3 Dredging Costs

7.3.2.3.1 Lake Yale

A summary of estimated costs for hydraulic dredging of Lake Yale is given on Table 7-10. Costs for hydraulic dredging typically range from approximately \$5-15/yd^3 which include the actual dredging, pumping of the dredged slurry to the containment area, construction of containment area berms, construction of a return water discharge from the containment area, and expenses for treatment of the dredged slurry to meet discharge requirements. For purposes of estimating costs for Lake Yale, an assumed dredging cost of \$10/yd^3 is used due to the large project size.

TABLE 7-10

ESTIMATED COSTS FOR HYDRAULIC DREDGING OF LAKE YALE

PARAMETER	UNITS	VALUE
Dredged Volume	yd^3	33,436,333
Assumed Dredging Cost	\$/yd^3	10.00
Dredging Cost	\$	334,363,330
Assumed Land Costs	\$/acre	20,000
Land Costs (if required)	\$	186,520,000
Engineering/Design	\$	2,000,000
Total Cost (with Land)	\$	522,883,330
Total Cost (without Land)	\$	336,363,330

The estimated dredging cost for removal of 33,436,333 yd^3 of material from Lake Yale is approximately \$334,363,330 which does not include costs associated with land purchase which may be required for the containment area. Assuming that land purchase is required at a unit

cost of $20,000/ac, the land cost for the 9,326-ac parcel would be approximately $185,520,000. An additional $2,000,000 is included for engineering, design and testing during the dredging feasibility analysis phase. The estimated total project cost with land purchase is approximately $522,883,330, or $336,363,330 without land purchase. However, the spoils containment area can often be repurposed or sold which may recoup some of the initial land cost.

7.3.2.3.2 Trout Lake

A summary of estimated costs for hydraulic dredging of Trout Lake is given on Table 7-11. For purposes of estimating costs for Trout Lake, an assumed dredging cost of $10/yd^3 is used due to the large project size. The estimated dredging cost for removal of 375,907 yd^3 of material from Trout Lake is approximately $3,759,070 which does not include costs associated with land purchase which may be required for the containment area. Assuming that land purchase is required at a unit cost of $20,000/ac, the land cost for the 102-ac parcel would be approximately $2,040,000. An additional $1,000,000 is included for engineering, design and testing during the dredging feasibility analysis phase. The estimated total project cost with land purchase is approximately $6,799,070, or $4,759,070 without land purchase. However, the spoils containment area can often be repurposed or sold which may recoup some of the initial land cost.

TABLE 7-11

ESTIMATED COSTS FOR HYDRAULIC DREDGING OF TROUT LAKE

PARAMETER	UNITS	VALUE
Dredged Volume	yd^3	375,907
Assumed Dredging Cost	$/yd^3	10.00
Dredging Cost	$	3,759,070
Assumed Land Costs	$/acre	20,000
Land Costs (if required)	$	2,040,000
Engineering/Design	$	1,000,000
Total Cost (with Land)	$	6,799,070
Total Cost (without Land)	$	4,759,070

7.3.2.4 Phosphorus Removal Costs

7.3.2.4.1 Lake Yale

A summary of estimated phosphorus removal costs for hydraulic dredging of Lake Yale is given in Table 7-12. This analysis assumes that the hydraulic dredging will reduce internal recycling by approximately 80%. It is unlikely that internal recycling will be eliminated completely for several reasons. First, previous evaluations of dredging projects have indicated that dredging is rarely 100% effective in removing sediments, and isolated pockets of sediments will remain which may redistribute over the bottom of the lake, contributing a small continued internal loading. Second, the parent material which is exposed as a result of the dredging may also have a limited phosphorus release in spite of sediment removal. Therefore, this analysis assumes that only 80% of the existing internal loading will be eliminated as a result of hydraulic dredging. As indicated in Table 5-22, internal recycling contributes approximately 7,981 kg of total phosphorus per year to Lake Yale. Hydraulic dredging of the sediments from the lake would reduce this figure to approximately 1,596 kg/yr.

TABLE 7-12

ESTIMATED PHOSPHORUS REMOVAL COSTS FOR HYDRAULIC DREDGING OF LAKE YALE

PARAMETER	UNITS	VALUE
Analysis Period	years	20
Internal Phosphorus Load	kg/yr	7,981
Estimated Total Phosphorus Load Reduction	% kg/yr	80 6,385
Total Phosphorus Reduction over 20-year Period	kg	127,696
Present Worth - 20 yr (with Land Purchase)	$/kg TP	4,095
Present Worth - 20 yr (without Land Purchase)	$/kg TP	2,634

A present worth analysis of phosphorus removal costs was also conducted for the evaluated sediment dredging process. This evaluation assumes an analysis period of 20 years, with a total phosphorus reduction of approximately 127,696 kg over the 20-year period. The resulting 20-year present worth cost is obtained by dividing the estimated total hydraulic dredging costs by the anticipated total phosphorus reduction over the 20-year analysis period.

Estimated phosphorus removal costs for hydraulic dredging are provided at the bottom of Table 7-12. The estimated present worth cost assuming that land purchase is required is approximately $4,095/kg of total phosphorus removed. If land purchase is not required, the estimated 20-year present worth cost is reduced to $2,634/kg. These values reflect elevated phosphorus removal costs similar to values associated with gross pollutant separators.

7.3.2.4.2 Trout Lake

A summary of estimated phosphorus removal costs for hydraulic dredging of Trout Lake is given in Table 7-13. Based on the reasons outlined previously, this analysis assumes that only 80% of the existing internal loading will be eliminated as a result of hydraulic dredging. As indicated in Table 5-23, internal recycling contributes approximately 172 kg of total phosphorus per year to Trout Lake. Hydraulic dredging of the sediments from the lake would reduce this figure to approximately 34.4 kg/yr.

A present worth analysis of phosphorus removal costs was conducted for the evaluated sediment dredging process. This evaluation assumes an analysis period of 20 years, with a total phosphorus reduction of approximately 2,752 kg over the 20-year period. The resulting 20-year present worth cost is obtained by dividing the estimated total hydraulic dredging costs by the anticipated total phosphorus reduction over the 20-year analysis period.

Estimated phosphorus removal costs for hydraulic dredging are provided at the bottom of Table 7-13. The estimated present worth cost assuming that land purchase is required is approximately $2,471/kg of total phosphorus removed. If land purchase is not required, the estimated 20-year present worth cost is reduced to $1,729/kg. These values reflect elevated phosphorus removal costs similar to values associated with gross pollutant separators.

TABLE 7-13

ESTIMATED PHOSPHORUS REMOVAL COSTS FOR HYDRAULIC DREDGING OF TROUT LAKE

PARAMETER	UNITS	VALUE
Analysis Period	years	20
Internal Phosphorus Load	kg/yr	172
Estimated Total Phosphorus Load Reduction	% kg/yr	80 137.6
Total Phosphorus Reduction over 20-year Period	kg	2,752
Present Worth - 20 yr (with Land Purchase)	$/kg TP	2,471
Present Worth - 20 yr (without Land Purchase)	$/kg TP	1,729

7.3.3 Sediment Inactivation

7.3.3.1 Introduction

Sediment phosphorus inactivation is a lake restoration technique which is designed to substantially reduce sediment phosphorus release by combining available phosphorus in the sediments with a metal salt to form an insoluble inert precipitate, rendering the sediment phosphorus unavailable for release into the overlying water column. Although salts of aluminum calcium and iron have been used for sediment inactivation in previous projects, aluminum salts are the clear compounds of choice for this application. Inactivation of sediment phosphorus using aluminum is often a substantially less expensive option for reducing sediment phosphorus release since removal of the existing sediments is not required.

Sediment phosphorus inactivation is most often performed using aluminum sulfate, commonly called alum, which is applied at the surface in a liquid form using a boat or barge. Upon entering the water column, the alum forms an insoluble precipitate of aluminum hydroxide which attracts phosphorus, bacteria, algae, and suspended solids within the water column, settling these constituents into the bottom sediments. Upon reaching the bottom sediments, the residual aluminum binds tightly with phosphorus within the sediments, forming an inert precipitate which will not be re-released under any conceivable condition of pH or redox potential which could occur in a natural lake system. More than 40 whole-lake sediment inactivation projects have been conducted within the State of Florida, with the first large-scale application conducted during 1992 on Lake Conine in Polk County. Previous sediment inactivation projects have been effective from 7->25 years, with no evidence of water quality degradation in Lake Conine after 25 years.

Sediment inactivation involves addition of liquid aluminum sulfate at the water surface. Upon entering the water, the alum would form insoluble precipitates which would settle onto the bottom while also clarifying the existing water column within the lake. Upon entering the sediments, the alum will combine with existing phosphorus within the sediments, primarily saloid- and iron-bound associations, forming insoluble inert precipitates which will bind the phosphorus, making it unavailable for release into the overlying water column. It is generally recognized that the top 10 cm layer of the sediments is the most active in terms of release of phosphorus under anoxic conditions. Therefore, the objective of a sediment inactivation project is to provide sufficient alum to bind the saloid- and iron-bound phosphorus associations in the top 10 cm of the sediments.

Due to differences in electronegativities, phosphorus preferentially attaches to iron in sediments before aluminum. The concept behind inactivating sediment phosphorus using aluminum is based upon increasing aluminum concentrations within the sediments to the point where phosphorus would preferentially bind with aluminum rather than in an unstable form with iron. The addition of aluminum to the sediments uses the principal of Le Chatelier that an increase in reactants (in this case aluminum) will drive the chemical reaction to increase the concentration of the products (aluminum-bound phosphorus). Previous sediment inactivation work conducted by ERD as well as other researchers has indicated that a molar Al:P ratio of 10:1 is typically sufficient to provide a driving force to allow aluminum to preferentially absorb phosphorus in sediments over iron.

Estimates of chemical requirements for sediment inactivation projects are typically based upon the mass of total available phosphorus within the top 0-10 cm layer of the sediments. For sediment inactivation purposes, available phosphorus is defined as the sum of the saloid-bound phosphorus, defined as soluble + easily exchangeable, and iron-bound phosphorus associations. Phosphorus bound to iron in the sediments is stable under aerobic conditions, but solubilizes under anoxic conditions and is subject to re-release from the sediments into the overlying water column.

Additional aluminum can be added to the sediments to create an active absorption mechanism for other phosphorus inputs into the water column as a result of groundwater seepage. Inputs of phosphorus from groundwater seepage into a lake can easily exceed inputs from internal recycling in only a few annual cycles. Carefully planned applications of alum can provide an abundance of aluminum which can intercept groundwater inputs of phosphorus, regardless of source, over a period of many years. As a result, alum applications can be used to eliminate phosphorus from the combined inputs resulting from internal recycling as well as groundwater seepage.

7.3.3.1.1 Lake Yale

Based on the nutrient budget for Lake Yale (summarized in Table 5-22), internal recycling contributes approximately 80% of the phosphorus loading to the lake, with an additional 2% contributed by groundwater seepage. It is possible to control both internal recycling and groundwater seepage through a carefully planned alum treatment application. Therefore, the goal of the proposed sediment inactivation treatment for Lake Yale is to add sufficient aluminum to provide simultaneous control for both internal recycling and groundwater seepage. Together, these sources contribute approximately 82% of the current total phosphorus loading to the lake. Control of these inputs has the potential to result in substantial improvements in water quality within Lake Yale.

7.3.3.1.2 Trout Lake

Based on the nutrient budget for Trout Lake (summarized in Table 5-23), internal recycling contributes approximately 33% of the phosphorus loading to the lake, with an additional 21% contributed by groundwater seepage. It is possible to control both internal recycling and groundwater seepage through a carefully planned alum treatment application. Therefore, the goal of the proposed sediment inactivation treatment for Trout Lake is to add sufficient aluminum to provide simultaneous control for both internal recycling and groundwater seepage. Together, these sources contribute approximately 54% of the current total phosphorus loading to the lake. Control of these inputs has the potential to result in substantial improvements in water quality within Trout Lake.

7.3.3.2 Chemical Requirements and Costs

7.3.3.2.1 Lake Yale

Estimates of the mass of total available phosphorus within the top 0-10 cm layer of the sediments in Lake Yale were generated by graphically integrating the total available phosphorus isopleths presented on Figure 2-29. The top 0-10 cm layer of the sediments is considered to be the most active layer with respect to exchange of phosphorus between the sediments and the overlying water column, and inactivation of phosphorus within the 0-10 cm layer is typically sufficient to inactivate sediment release of phosphorus within a lake. Recent data collected by ERD suggests that the Al:P ratio is impacted by the concentration of available phosphorus in the sediments, with higher Al:P ratios required for lower available sediment phosphorus concentrations, generally in the range of 50 $\mu g/cm^3$ or less. The geometric mean concentration for total available phosphorus in Lake Yale is 77 $\mu g/cm^3$ (Table 2-13), so a 10:1 ratio is used for this evaluation.

A summary of estimated total available phosphorus in the sediments of Lake Yale and alum requirements for sediment inactivation is given in Table 7-14. On a mass basis, the sediments of Lake Yale contain approximately 129,629 kg of available phosphorus in the top 10 cm which equates to approximately 4,181,574 moles of available phosphorus to be inactivated as part of the sediment inactivation process. Since the overall mean sediment available phosphorus concentration in Lake Yale of 77 $\mu g/cm^3$ is above the concentration where a higher Al:P ratio may be required, the assumed Al:P ratio for Lake Yale is 10:1. Using an Al:P ratio of 10:1, sediment inactivation in Lake Yale would require approximately 5,091,808 gallons of alum, equivalent to 1,132 tanker loads. The equivalent aerial aluminum dose for this application would be 69.5 g Al/m^2.

TABLE 7-14

LAKE YALE SEDIMENT INACTIVATION REQUIREMENTS

AVAILABLE P CONTOUR INTERVAL ($\mu g/cm^3$)	CONTOUR INTERVAL MID-POINT ($\mu g/cm^3$)	CONTOUR AREA (acres)	AVAILABLE PHOSPHORUS		ALUM REQUIREMENTS (Al:P Ratio = 10:1)	
			kg	moles	moles Al	gallons alum
40-50	45	126.1	2,297	74,086	740,865	90,213
50-60	55	482.5	10,745	346,608	3,466,079	422,057
60-70	65	617.5	16,251	524,238	5,242,384	638,353
70-80	75	653.6	19,848	640,253	6,402,533	779,622
80-90	85	811.1	27,915	900,475	9,004,753	1,096,488
90-100	95	941.7	36,222	1,168,454	11,684,540	1,422,800
100-110	105	331.2	14,079	454,176	4,541,764	553,040
110-120	115	48.8	2,272	73,282	732,824	89,234
Overall Totals:		4,012.4	129,629	4,181,574	41,815,742	5,091,808

Areal Aluminum Dose: 69.5 g Al/m^2
Water Column Dose: 21.2 mg Al/liter

A summary of alum requirements for control of phosphorus loading from groundwater seepage entering Lake Yale is given in Table 7-15. Based on the field seepage monitoring program conducted by ERD, phosphorus inflow to Lake Yale from groundwater seepage is estimated to be approximately 149 kg/yr. This analysis assumes that control of groundwater seepage is desired for a period of approximately 10 years. Therefore, the total mass of phosphorus from groundwater seepage which must be inactivated over the 10-year period is approximately 1,490 kg which equates to approximately 48,065 moles of total phosphorus. Assuming an Al:P ratio of 10:1 for adequate inactivation, control of 48,065 moles of total phosphorus will require approximately 480,645 moles of aluminum which equates to an alum volume of 58,527 gallons.

TABLE 7-15

ALUM REQUIREMENTS FOR CONTROL OF PHOSPHORUS LOADING FROM GROUNDWATER SEEPAGE TO LAKE YALE

PARAMETER		UNITS	VALUE
Estimated Phosphorus Mass to be Controlled	Seepage Phosphorus Loading	g/m^2-yr	0.009
	Annual Phosphorus Loading from Seepage	kg/yr	149
	Desired Length of Control	years	10
	Total Phosphorus Mass to be Inactivated	kg	1,490
	Moles of Phosphorus to be Inactivated	moles	48,065
Alum Requirements	Inactivation Al:P Ratio	--	10
	Moles of Aluminum Required	moles	480,645
	Alum Required	gallons	58,527
	Number of Tankers @4500 gallons	--	13.0
	Mean Water Column Dose	mg Al/liter	0.2

1. Based on an Al:P ratio of 10:1

The proposed alum treatment to Lake Yale would add sufficient alum to control both internal recycling and intercept phosphorus loadings from groundwater seepage. Assuming that approximately 5,091,808 gallons of alum are needed for sediment inactivation and 58,527 gallons of alum are needed for interception of groundwater seepage, the total amount of alum to be added to Lake Yale would be 5,150,336 gallons. This equates to a whole-lake alum dose of approximately 21.5 mg Al/liter which likely exceeds the available buffering capacity in the lake to withstand reductions in water column pH. As a result, the proposed treatment would need to be divided into a series of multiple applications to reduce the pH impacts from the application.

Previous alum surface applications performed for inactivation of sediment phosphorus release by ERD have indicated that the greatest degree of improvement in surface water characteristics and the highest degree of inactivation of sediment phosphorus release are achieved through multiple applications of aluminum to the waterbody spaced at intervals of approximately 4-12 months. Each subsequent application results in additional improvements in water column quality and additional aluminum floc added to the sediments for long-term inactivation of sediment phosphorus release.

If the proposed alum application were to be divided into 4 treatments, the alum dose per treatment would be 5.4 mg Al/liter (21.5 mg Al/liter divided by 4 treatments) which is an acceptable dose per application. If the applications were scheduled at 6-12 month intervals, then the normal alkalinity within the lake would be largely restored between treatments. Assuming a capacity of 4,500 gallons for a typical alum delivery tanker, the required alum volume of 5,150,336 gallons is equivalent to 1,145 tankers or approximately 286 tankers per application.

A summary of proposed alum requirements to control internal recycling and groundwater seepage in Lake Yale is given in Table 7-16. It is recommended that the treatment be divided into 4 separate applications, with approximately one-fourth of the required alum volume applied during each application. Each treatment would be applied using a boat or barge to spread the chemicals over the lake surface. The recommended chemical volumes per application are indicated in the final column of Table 7-16.

TABLE 7-16

SUMMARY OF ALUM REQUIREMENTS FOR CONTROL OF SEDIMENT PHOSPHORUS RELEASE AND GROUNDWATER SEEPAGE ENTERING LAKE YALE

PARAMETER		UNITS	VALUE
Overall Alum Requirements	Alum	gallons	5,150,336
	Number of Tankers	--	1,145
	Water Column Dose	mg Al/liter	21.5
	Areal Dose	g Al/m^2	70.3
Chemical Requirements per Treatment	Number of Treatments	--	4
	Alum Required per Treatment	gallons	1,287,584
	Dose Per Treatment	mg Al/liter	5.4
	Number of Tankers	--	286

A summary of estimated application costs for sediment inactivation and control of groundwater seepage in Lake Yale is given in Table 7-17. This estimate assumes an alum volume of 5,150,336 gallons (1,145 tankers) will be applied during a total of 4 separate applications. It is assumed that the alum is purchased directly by LCWA at the current contract price of $0.45/gallon. Planning and mobilization costs are estimated to be approximately $15,000 per application, which includes initial planning, mobilization of equipment to the site, demobilization at the completion of the application process, and clean-up. A unit application rate of $1,350/tanker is assumed which includes labor costs, daily water quality monitoring during the application, expenses, equipment rental, insurance, mileage, and application equipment fees. The estimated cost for sediment inactivation and control of groundwater seepage in Lake Yale is $3,944,251 or approximately $986,063 per application. Since the treatment will be spread out over several years, the treatment costs can be distributed over multiple fiscal years.

TABLE 7-17

ESTIMATED APPLICATION COSTS FOR SEDIMENT INACTIVATION AND CONTROL OF GROUNDWATER SEEPAGE IN LAKE YALE (Based on 4 separate treatments)

PARAMETER		QUANTITY/ TREATMENT	UNITS	UNIT COST ($)	COST/ TREATMENT ($)	TOTAL COST ($)
Chemical Costs	Alum	1,287,584	gallons	0.45[1]	579,413	2,317,651
Labor Costs	Planning/Mobilization	1	each	15,000	15,000	60,000
	Chemical Application	287	tankers	1,350[2]	387,450	1,549,800
Monitoring/ Lab Testing	Field Monitoring	1	each	1,000	1,000	4,000
	Lab Analyses (pre/post)	16	samples	200	3,200	12,800
				TOTAL:	**$ 986,063**	**$ 3,944,251**

1. Assumed contract cost
2. Includes raw labor, water quality monitoring, insurance, expenses, application equipment, mileage, and rentals

Estimates of phosphorus mass removal costs were also calculated for the proposed Lake Yale alum treatment. A summary of this analysis is given in Table 7-18. This analysis assumes that the sediment inactivation will be effective in reducing internal recycling and seepage phosphorous loadings for a minimum period of 10 years. Therefore, over the 10-year period of effectiveness, internal recycling will contribute approximately 79,810 kg (7,981 kg/yr x 10 years) of total phosphorus to Lake Yale. As presented in Table 7-15, inputs of total phosphorus from groundwater seepage have the potential to contribute 1,490 kg (149 kg/yr x 10 years) over the same 10-year period of control. Therefore, over the anticipated 10-year period of control, the combined inputs of internal recycling and groundwater seepage have the potential to contribute approximately 81,229 kg of total phosphorus to Lake Yale.

Based on previous research performed by ERD, phosphorus inactivation is approximately 80% effective in retaining available phosphorus within sediments. Therefore, it is assumed that approximately 80% of the potential 79,810 kg of total phosphorus is attenuated by the proposed alum treatment. As a result, the proposed alum treatment has the potential to remove approximately 63,848 kg of total phosphorus from Lake Yale over the 10-year anticipated life or approximately 6,385 kg/yr. Based upon the estimated treatment cost of $3,944,251, the cost per kg of phosphorus removed for the proposed alum treatment is $61/kg. This is an extremely attractive phosphorus removal cost, particularly when compared with traditional stormwater retrofit options which frequently exceed $1,000-10,000/kg of total phosphorus.

TABLE 7-18

PHOSPHORUS REMOVAL COSTS FOR SEDIMENT INACTIVATION IN LAKE YALE

PARAMETER		UNITS	VALUE
Existing Total Phosphorus Loadings	Internal Recycling – 10 years	kg/yr	79,809
	Seepage Inflow – 10 years	kg/yr	1,490
	Total:	**kg/yr**	**81,299**
Removal by Alum Treatment	Internal Recycling	% kg	80 63,848
	Seepage Inflow	% kg	80 1,192
	Total:	**kg**	**65,040**
Alum Treatment Cost	Internal Recycling + Seepage	$	3,944,251
Total Phosphorus Removal Cost	**--**	**$/kg** **$/lb**	**61** **28**

1. Assumes a 10-year period of effective control
2. Assumes that 80% of the internal recycling and seepage load is removed

7.3.3.2.2 Trout Lake

Estimates of the mass of total available phosphorus within the top 0-10 cm layer of the sediments in Trout Lake were generated by graphically integrating the total available phosphorus isopleths presented on Figure 2-25. The top 0-10 cm layer of the sediments is considered to be the most active layer with respect to exchange of phosphorus between the sediments and the overlying water column, and inactivation of phosphorus within the 0-10 cm layer is typically sufficient to inactivate sediment release of phosphorus within a lake. Recent data collected by ERD suggests that the Al:P ratio is impacted by the concentration of available phosphorus in the sediments, with higher Al:P ratios required for lower available sediment phosphorus concentrations, generally in the range of 50 $\mu g/cm^3$ or less. The geometric mean concentration for total available phosphorus in Trout Lake is 104 $\mu g/cm^3$ (Table 2-12), so a 10:1 ratio is used for this evaluation.

A summary of estimated total available phosphorus in the sediments of Trout Lake and alum requirements for sediment inactivation is given in Table 7-19. On a mass basis, the sediments of Trout Lake contain approximately 5,184 kg of available phosphorus in the top 10 cm which equates to approximately 167,226 moles of available phosphorus to be inactivated as part of the sediment inactivation process. Since the overall mean sediment available phosphorus concentration in Trout Lake of 104 $\mu g/cm^3$ is above the concentration where a higher Al:P ratio may be required, the assumed Al:P ratio for Trout Lake is 10:1. Using an Al:P ratio of 10:1, sediment inactivation in Trout Lake would require approximately 203,627 gallons of alum, equivalent to 45.3 tankers of alum.

TABLE 7-19

TROUT LAKE SEDIMENT INACTIVATION REQUIREMENTS

AVAILABLE P CONTOUR INTERVAL ($\mu g/cm^3$)	CONTOUR INTERVAL MID-POINT ($\mu g/cm^3$)	CONTOUR AREA (acres)	AVAILABLE PHOSPHORUS		ALUM REQUIREMENTS (Al:P Ratio = 10:1)	
			kg	moles	moles Al	gallons alum
20-40	30	0.65	8	253	2,530	308
40-60	50	1.42	29	926	9,260	1,128
60-80	70	5.78	164	5,283	52,830	6,433
80-100	90	17.42	635	20,479	204,792	24,937
100-120	110	30.83	1,373	44,297	442,965	53,939
120-140	130	24.76	1,303	42,035	420,347	51,185
140-160	150	15.67	951	30,693	306,929	37,374
160-180	170	4.94	340	10,958	109,578	13,343
180-200	190	3.16	243	7,831	78,309	9,536
200-220	210	1.63	139	4,472	44,715	5,445
Overall Totals:		106.2	5,184	167,226	1,672,256	203,627

Areal Aluminum Dose: 105 g Al/m^2
Water Column Dose: 45.4 mg Al/liter

A summary of calculations of alum requirements for control of phosphorus loading from groundwater seepage entering Trout Lake is given in Table 7-20. Based on the field seepage monitoring program conducted by ERD, phosphorus inflow to Trout Lake from groundwater seepage is estimated to be approximately 108.5 kg/yr. This analysis assumes that control of groundwater seepage is desired for a period of approximately 10 years. Therefore, the total mass of phosphorus from groundwater seepage which must be inactivated over the 10-year period is approximately 1,085 kg which equates to approximately 34,997 moles of total phosphorus. Assuming an Al:P ratio of 10:1 for adequate inactivation, control of 34,997 moles of total phosphorus will require approximately 349,973 moles of aluminum which equates to an alum volume of 42,615 gallons.

The proposed alum treatment to Trout Lake would add sufficient alum to control both internal recycling and intercept phosphorus loadings from groundwater seepage. Assuming that approximately 203,627 gallons of alum are needed for sediment inactivation and 42,615 gallons of alum are needed for interception of groundwater seepage, the total amount of alum to be added to Trout Lake would be 246,242 gallons. This equates to a whole-lake water column dose of approximately 55.0 mg Al/liter which far exceeds the available buffering capacity in the lake to withstand potential reductions in water column pH. As a result, the proposed treatment would need to be divided into a series of multiple applications to reduce the pH impacts from the application and avoid use of expensive buffering agents.

TABLE 7-20

ALUM REQUIREMENTS FOR CONTROL OF PHOSPHORUS LOADING FROM GROUNDWATER SEEPAGE TO TROUT LAKE

PARAMETER		UNITS	VALUE
Estimated Phosphorus Mass to be Controlled	Seepage Phosphorus Loading	g/m^2-yr	0.252
	Annual Phosphorus Loading from Seepage	kg/yr	108.5
	Desired Length of Control	years	10
	Total Phosphorus Mass to be Inactivated	kg	1,085
	Moles of Phosphorus to be Inactivated	moles	34,997
Alum Requirements	Inactivation Al:P Ratio	--	10
	Moles of Aluminum Required	moles	349,973
	Alum Required	gallons	42,615
	Number of Tankers @4500 gallons	--	9.5

1. Based on an Al:P ratio of 10:1

Previous alum surface applications performed for inactivation of sediment phosphorus release by ERD have indicated that the greatest degree of improvement in surface water characteristics and the highest degree of inactivation of sediment phosphorus release are achieved through multiple applications of aluminum to the waterbody spaced at intervals of approximately 4-6 months. Each subsequent application results in additional improvements in water column quality and additional aluminum floc added to the sediments for long-term inactivation of sediment phosphorus release.

The aluminum dose that a lake can accept without negative pH impacts is a function of the lake alkalinity. During the field monitoring program conducted by ERD, the alkalinity in Trout Lake varied throughout the year. Alkalinity values less than 40 mg/l were observed from October-April, increasing to 40-60 mg/l from May-September. Therefore, the best time to apply alum to Trout Lake would be during the summer months when alkalinity values are greatest. In general, an application of 1 mg Al/liter consumes approximately 3 mg/l of alkalinity. Assuming that the lake has an alkalinity of approximately 55 mg/l at the time of application, the alum could consume as much as 35 mg/l alkalinity without depressing the alkalinity below the Class III minimum of 20 mg/l, which corresponds to a maximum alum dose of 10-12 mg Al/liter which would consume approximately 30-36 mg/l of alkalinity from the lake. The hydraulic residence time of Trout Lake is approximately 167 days, so the normal alkalinity within the lake would be restored in approximately 6 months.

A summary of proposed alum requirements to control internal recycling and groundwater seepage in Trout Lake is given in Table 7-21. If the proposed alum application were to be divided into 5 treatments, the alum dose per treatment would be 11.0 mg Al/liter (55.0 mg Al/liter divided by 5 treatments) which is an acceptable dose per application. If the applications were scheduled at 12-month intervals, then the normal summertime alkalinity within the lake would be sufficient to buffer the dose without using supplemental buffer chemicals and the alkalinity would be largely restored between treatments. Based on the overall requirement of 54.7 tankers, the alum volume per application would be 10.9 tankers. Since partial tanker shipments of alum are virtually the same cost as full tankers due to shipping costs, the recommended alum volume is rounded up to 11 tankers (4,500 gallons each) per treatment or 55 tankers total. The recommended chemical volumes per application are indicated in the final column of Table 7-21.

TABLE 7-21

SUMMARY OF ALUM REQUIREMENTS FOR CONTROL OF SEDIMENT PHOSPHORUS RELEASE AND GROUNDWATER SEEPAGE ENTERING TROUT LAKE

PARAMETER		UNITS	VALUE
Overall Alum Requirements	Alum	gallons	246,242
	Number of Tankers	--	54.7
	Water Column Dose	mg Al/liter	55.0
	Areal Dose	g Al/m^2	126.9
Chemical Requirements per Treatment	Number of Treatments	--	5
	Alum Required per Treatment	gallons	49,248
	Dose Per Treatment	mg Al/liter	11.0
	Number of Tankers	--	10.9

A summary of estimated application costs for sediment inactivation and control of groundwater seepage in Trout Lake is given in Table 7-22. This estimate assumes an alum volume of 246,242 gallons (55 tankers) will be applied during a total of 5 separate applications. It is assumed that the alum is purchased directly by LCWA at the current contract price of $0.45/gallon. Planning and mobilization costs are estimated to be approximately $10,000 per application, which includes initial planning, mobilization of equipment to the site, demobilization at the completion of the application process, and clean-up. A unit application rate of $1,500/tanker is assumed which includes labor costs, daily water quality monitoring during the application, expenses, equipment rental, insurance, mileage, and application equipment fees. The estimated cost for sediment inactivation and control of groundwater seepage in Trout Lake is $267,059 or approximately $53,412 per application of which $22,162 is chemical purchase and $31,250 for application. Applications can be conducted annually during the summer months for 5 years, or the applications could be conducted at the beginning and end of the summer period to decrease the overall treatment period. Since the treatment will be spread out over several years, the treatment costs can be distributed over multiple fiscal years.

TABLE 7-22

ESTIMATED APPLICATION COSTS FOR SEDIMENT INACTIVATION AND CONTROL OF GROUNDWATER SEEPAGE IN TROUT LAKE (Based on 5 separate treatments)

PARAMETER		QUANTITY/ TREATMENT	UNITS	UNIT COST ($)	COST/ TREATMENT ($)	TOTAL COST ($)
Chemical Costs	Alum	49,248	gallons	0.45[1]	22,162	110,809
Labor Costs	Planning/Mobilization	1	each	10,000	10,000	50,000
	Chemical Application	11	tankers	1,500[2]	16,500	82,500
Monitoring/ Lab Testing	Field Monitoring	1	each	750	750	3,750
	Lab Analyses (pre/post)	20	samples	200	4,000	20,000
				TOTAL:	**$ 53,412**	**$ 267,059**

1. Assumed contract cost
2. Includes raw labor, water quality monitoring, insurance, expenses, application equipment, mileage, and rentals

Estimates of phosphorus mass removal costs were also calculated for the proposed Trout Lake alum treatment. A summary of this analysis is given in Table 7-23. This analysis assumes that the sediment inactivation will be effective in reducing internal recycling and seepage phosphorous loadings for a minimum period of 10 years. Therefore, over the 10-year period of effectiveness, internal recycling will contribute approximately 1,718 kg (171.8 kg/yr x 10 years) of total phosphorus to Trout Lake. As presented in Table 7-19, inputs of total phosphorus to Trout Lake from groundwater seepage have the potential to contribute 1,085 kg (108.5 kg/yr x 10 years) over the same 10-year period of control. Therefore, over the anticipated 10-year period of control, the combined inputs of internal recycling and groundwater seepage have the potential to contribute approximately 2,803 kg of total phosphorus to Trout Lake.

Based on previous research performed by ERD, phosphorus inactivation is approximately 80% effective in retaining available phosphorus within sediments. Therefore, it is assumed that approximately 80% of the 2,803 kg of total phosphorus contributed by internal recycling and groundwater seepage is attenuated by the proposed alum treatment. As a result, the proposed alum treatment has the potential to remove approximately 2,242 kg of total phosphorus from Trout Lake over the 10-year anticipated life or approximately 224 kg/yr. Based upon the total estimated treatment cost of $267,059, the cost per kg of phosphorus removed for the proposed alum treatment is $119/kg. This is an extremely attractive phosphorus removal cost, particularly when compared with traditional stormwater retrofit options which frequently exceed $1,000-10,000/kg of total phosphorus.

TABLE 7-23

PHOSPHORUS REMOVAL COSTS FOR SEDIMENT INACTIVATION IN TROUT LAKE

PARAMETER		UNITS	VALUE
Existing Total Phosphorus Loadings	Internal Recycling – 10 years	kg/yr	1,718
	Seepage Inflow – 10 years	kg/yr	1,085
	Total:	**kg/yr**	**2,803**
Removal by Alum Treatment	Internal Recycling	% kg	80 1,374.3
	Seepage Inflow	% kg	80 867.9
	Total:	**kg**	**2,242**
Alum Treatment Cost	Internal Recycling + Seepage	$	267,059
Total Phosphorus Removal Cost	**--**	**$/kg** **$/lb**	**119** **54**

1. Assumes a 10-year period of effective control
2. Assumes that 80% of the internal recycling and seepage load is removed

7.4 Rear Yard Berms and Swales

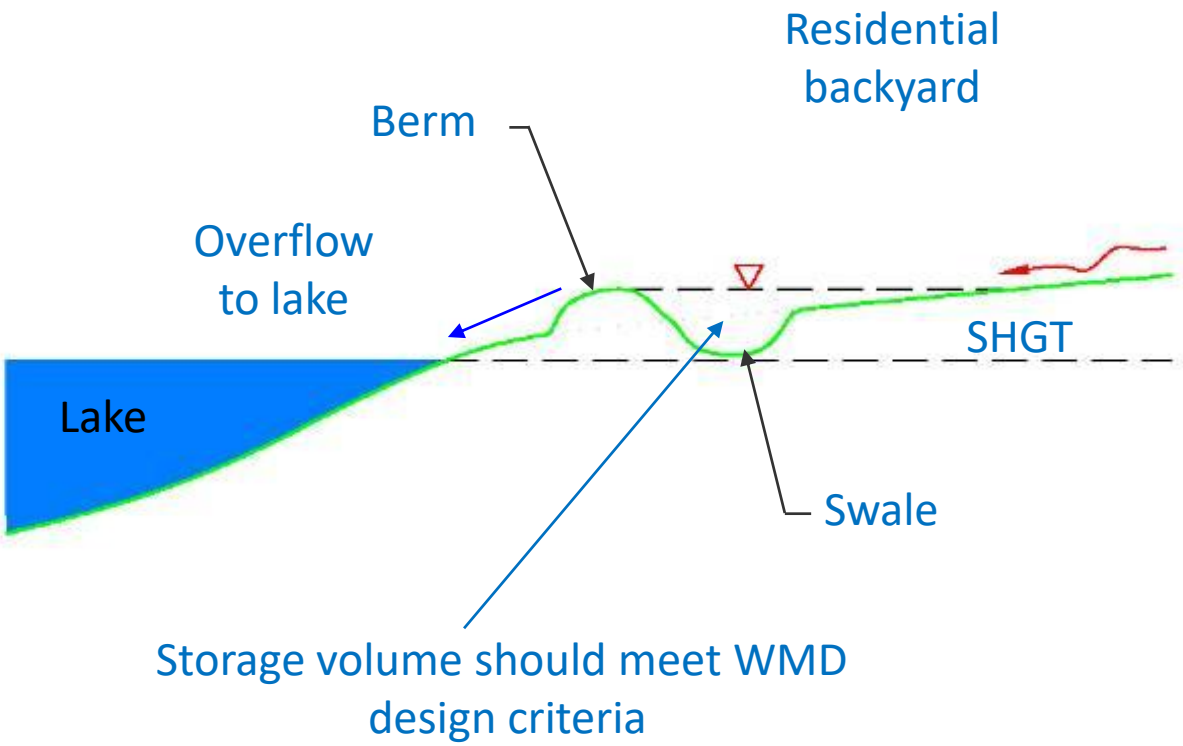
7.4.1 Introduction

A standard nutrient management technique that ERD commonly recommends is a berm and swale system to treat runoff from rear residential yards by direct overland flow. Rear yard areas on lake front homes have the potential to contribute significant loadings of nutrients and pesticides directly into a lake with no significant treatment of any kind. Even if stormwater management systems are built to control runoff generated within a lake front residential community, rear yard runoff discharges directly into the lake without the benefit of treatment processes within the stormwater management systems. Rear yard areas often have a steeper slope than front yard areas, further increasing the potential for runoff and pollutant transport from these areas.

The nutrient budgets for Lake Yale and Trout Lake (summarized on Tables 5-22 and 5-23) include a separate category for nutrient loadings to each lake as a result of direct overland flow from parcels adjacent to the lakes. However, direct overland flow contributes a negligible phosphorus loading to Lake Yale and Trout Lake, and the vast majority of shoreline property is undeveloped where berms and swales would not be practical. Therefore, berms and swales are not recommended for either Lake Yale or Trout Lake as a load reduction BMP, although this can be an effective technique for shoreline residential homes. ERD could not find any existing requirement for berms and swales in the current Lake County Development Codes, and although not practical at this time for Lake Yale or Trout Lake, may be useful for future development on Lake Yale or Trout Lake or for other lakes, so a brief discussion of the basic technique is provided in the following section..

The objective of a berm and swale system is to intercept runoff from the rear yard area, causing this volume to be infiltrated into the ground rather than directly discharging into the adjacent waterbody. As the intercepted runoff migrates through the vegetation and surficial soils, a large portion of the pollutant mass is attenuated and is prevented from reaching the adjacent water. Since these systems act primarily as retention areas, it is important that the area utilized for infiltration be constructed above the seasonal high groundwater table elevation. If the bottom of the infiltration area is not maintained above the seasonal high groundwater table elevation (SHGWT), the retention area will assume wetland characteristics and will gradually lose its ability to evacuate the required pollution abatement volume.

The volume of water retained by a rear yard swale or berm system is directly proportional to the performance efficiency of the system for reducing loadings discharging into the waterbodies. The minimum design criteria for retention systems constructed in the St. Johns River Water Management District is storage of the first 0.5-inch of runoff. This volume is calculated by multiplying the area of each parcel which discharges to the rear of the lot (rather than the front) times 0.50 inches over this area. The resulting volume represents the amount of water which should be retained in the rear yard and dictates the design of the swale and berm. A schematic of a recommended berm and swale design is given in Figure 7-2.



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Figure 7-2. Schematic of Recommended Rear Yard Swale and Berm Design.

Currently, Lake County has no requirement for construction of berm and swale systems to treat rear yard runoff for shoreline residential developments. However, construction of rear yard berms and swales is a requirement in other Central Florida counties, such as Orange County which has required berms and swales on lake front developments since 1985. The requirement for berms and swales is outlined in Section 34-132 of the Orange County Municipal Code, titled "Subdivision Construction Plans". The requirement for berms and swales consists of a single sentence located in paragraph c(2) which states that "… Pollution abatement swales shall be provided upland of streams and canals in the normal high water elevation in all lakes. …" However, this section provides no design criteria or guidelines for the required systems. Since the reference to berms and swales is located in a section titled "Subdivision Construction Plans", the requirement applies only to construction of new subdivisions and does not apply to single-family homes constructed on individual lots which are not part of a designated subdivision. This provision also does not apply to redevelopment (demolition and reconstruction) of an existing single-family lot

One of the common criticisms of berm and swale systems concerns ongoing maintenance of the areas. Where swale systems are used, bottom portions of the swale can become wet for extended periods, making mowing and maintenance activities difficult. Mowing of bermed areas can also be difficult, particularly if the berm is constructed with steep side slopes. However, virtually all of the maintenance concerns for bermed areas can be eliminated by constructing the berm with more gradual side slopes, such as 6(H):1(V) or flatter, and by designing the bottom of the swale portion above the seasonal high water level (SHWL) of the lake.

The overall objective of retaining direct runoff from rear yard areas can also be achieved using decorative walls or landscaped areas, as long as the areas provide retention for the specified treatment volume. A schematic of a typical wall section which would also provide retention for rear yard runoff is given in Figure 7-3. Given the multiple methods available, it is difficult to envision how the construction or presence of a runoff collection or retention area would create a significant hardship for any lake front property owner.

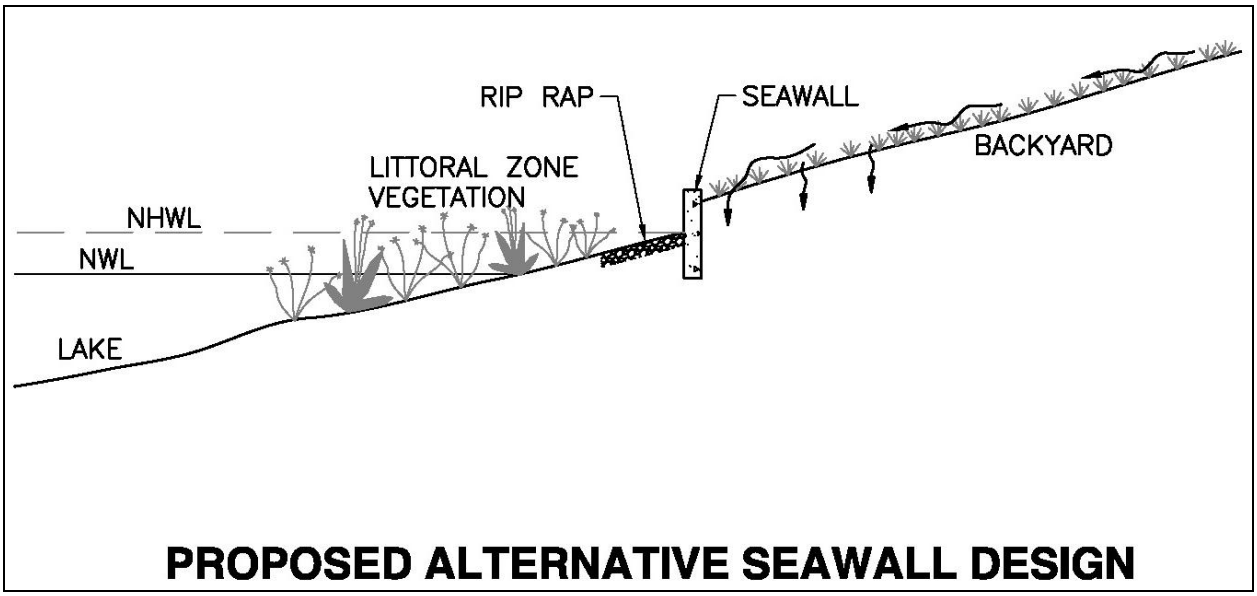


Figure 7-3. Alternative Seawall Design Used as Rear Yard Berm.

Berm and swale systems could provide an inexpensive method of reducing discharges of direct runoff from rear yards and landscaped areas into adjacent waterbodies. Construction of berm and swale systems has the potential to provide nutrient load reductions which are equivalent to a large structural retrofit project costing hundreds of thousands of dollars. Berm and swale systems, if designed to applicable SJRWMD design criteria requiring a minimum of 0.50-inch of retention, would be capable of providing an annual load reduction of approximately 60% for total phosphorus as well as a 60% reduction in annual runoff volume.

7.5 Vegetation Enhancement and Control

Shoreline vegetation is an essential component of a healthy lake ecosystem which provides many important functions such as interception of surface runoff and habitat for a wide variety of both juvenile and adult aquatic organisms. The importance of both emergent and submergent vegetation in lakes is often overlooked.

A recent study conducted by ERD on the Butler Chain-of-Lakes indicated that shoreline areas which are non-vegetated are susceptible to erosion and resuspension of sediments as a result of wave activity caused by boats or wind. Water samples collected from non-vegetated shorelines were found to have significantly higher water column concentrations of particulate phosphorus, total phosphorus, and total suspended solids. In addition to providing protection from erosion and sediment resuspension, shoreline vegetation also contributes to a diverse ecological community which is an important factor in maintaining good water quality characteristics within the water column. Shoreline vegetation provides an extremely beneficial function in lake ecosystems and should be maintained to the maximum extent possible. A discussion of existing conditions and control of vegetation in Lake Yale and Trout Lake is given in the following sections.

7.5.1 Lake Yale

7.5.1.1 Existing Conditions and Issues

Under existing conditions, Lake Yale contains an impressive assemblage of littoral zone vegetation which covers virtually all shoreline portions of the lake and includes a wide variety of aquatic species. The only exceptions to this generality are a few isolated residential parcels which have removed the littoral zone vegetation to maintain a vegetation-free shoreline.

Prior to the 1980s, bottom portions of Lake Yale were covered with vegetation. However, attempts at Hydrilla control using herbicides and introduction of a large number of grass carp resulted in virtually complete elimination of rooted vegetation in central portions of Lake Yale. As a result, Lake Yale was converted from a macrophyte-dominated system to a turbid algal-dominated system. The extensive algal growth reduced light penetration and inhibited re-growth of rooted vegetation.

In recent years, Lake Yale has also experienced an increase in floating tussocks, particularly on the southeast portion of the lake. Multiple projects have been conducted to address these floating tussocks using primarily mechanical removal methods.

7.5.1.2 Recommendations

In view of the extensive existing shoreline vegetation within Lake Yale, no enhancement of the existing shoreline vegetation is necessary at this time. However, re-establishment of the submerged vegetation in central portions of the lake is necessary to restore Lake Yale to the healthy oligotrophic status common during the 1970s. The nutrient budget for Lake Yale (summarized in Table 5-22) indicates that internal recycling contributes approximately 80% of the existing phosphorus loadings to the lake. A sediment inactivation project would eliminate a substantial portion of the existing phosphorus loadings to the lake, reducing algal productivity and increasing light penetration to bottom portions of the lake. Under these conditions, rooted submerged vegetation will return by natural mechanisms. It is likely that some of the returning vegetation will consist of Hydrilla, which needs to be controlled on a continuous basis to allow development of beneficial native vegetation. Therefore, the key to returning submerged rooted vegetation to Lake Yale appears to be implementation of the sediment inactivation program to reduce phosphorus loadings.

As discussed previously, increases in floating tussocks have been observed in Lake Yale in recent years, particularly in southeastern portions of the lake. Tussocks prefer areas with elevated nutrient levels, and the current substantially elevated loadings discharging from Sub-basin LYD 14-01 may be partially responsible for contributing to the recent tussock outbreaks. Therefore, investigation and elimination of these elevated phosphorus concentrations from Sub-basin LYD 14-01 may also prove helpful in reducing the frequency of tussock growth.

In summary, vegetation enhancement will likely be linked to recommended nutrient management practices for the lake which will allow vegetation to be restored naturally. Elimination of the elevated phosphorus concentrations originating within Sub-basin LYD 14-01 may also provide assistance with reducing the frequency of tussocks. However, continued vegetation control using herbicides and/or mechanical removal methods may still be necessary, although at a reduced frequency.

7.5.2 Trout Lake

7.5.2.1 Existing Conditions and Issues

As discussed in Section 2.6.2, shoreline portions of Trout Lake are heavily vegetated, although not necessarily with traditional littoral zone vegetation. The eastern two-thirds of Trout Lake are hydraulically connected to adjacent hardwood wetlands, and the lake simply transitions into areas of cypress trees and other herbaceous wetland vegetation. Littoral zone vegetation on the south and west sides of the lake consist primarily of brush and small tree-type species. The only area within the lake with no current littoral zone vegetation is the County Club Manor Mobile Home Park which has removed virtually all aquatic vegetation from areas adjacent to the seawall associated with the property.

During the field monitoring program conducted by ERD, no evidence of submerged rooted aquatic vegetation was observed at any location in Trout Lake. The extremely high color level within the lake severely limits penetration of solar radiation, making it impossible for rooted aquatic vegetation to exist within the lake. Rooted submerged vegetation cannot be established within the lake until the color within the lake is permanently reduced for extended periods.

7.5.2.2 Recommendations

No significant recommendations are warranted regarding vegetation control and enhancement in Trout Lake at this time other than re-establishment of the littoral zone vegetation adjacent to the seawall associated with Country Club Manor Mobile Home Park. Removal/control of exotic and nuisance shoreline vegetation should be conducted, as appropriate. Establishment of rooted submerged vegetation in Trout Lake does not appear to be feasible at this time.

7.6 Landscape Maintenance Activities

7.6.1 Existing Conditions and Issues

Lawn maintenance practices have the potential to substantially impact runoff characteristics and watershed loadings in developed areas. Under current conditions, developed areas comprise a relatively small portion of the drainage basin areas for Lake Yale and Trout Lake which minimizes potential impacts to the lakes. However, as the basin areas become developed over time, the significance of landscape activities on runoff characteristics will increase. Examples of improper landscape and lawn maintenance activities include blowing lawn clippings, leaves, and other vegetation debris onto paved or roadway surfaces, as well as improper application of both granular and liquid fertilizers to impervious surfaces and roadways.

When grass clippings and fertilizers are introduced onto impervious surfaces, they become available for mobilization by stormwater runoff during rain events, causing them to be deposited into the nearest waterbody during storm events. These type of lawn maintenance practices are needless and irresponsible activities which have the potential to significantly increase nutrient loadings to receiving waterbodies where these activities occur. At best, these activities occur as a result of lack of information and education, while at worst, they represent a disregard for water quality consequences in a misguided attempt to reduce labor time and costs.

During 2017, Lake County enacted Ordinance No. 2017-17 titled “Fertilizer Management Ordinance” which regulates application of fertilizer to lawns and turf in Lake County. The Ordinance is based on the FDEP Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes. The newly adopted Fertilizer Management Ordinance places restrictions on the timing and amount of fertilizer which can be applied to turf grasses in Lake County. Fertilizer containing nitrogen or phosphorus cannot be applied to turf during a period when weather advisories have been issued or at any time during the period from June 1-September 30 of each year. Applications may not exceed 0.25 lbs of phosphorus per 1000 ft^2 per application or exceed 0.5 lbs of phosphorus per 1000 ft^2 per year. Fertilizer-free zones are established within 10 ft of any waterbody or wetland, and it is strictly prohibited to apply fertilizer onto impervious surfaces. The Ordinance also outlines application practices to minimize and manage fertilizer spills and deposits.

The Ordinance also prohibits depositing, washing, sweeping, or blowing grass clipping or any vegetated material/debris onto any impervious surface, public right-of-way, stormwater drain, ditch, conveyance, or waterbody. This section is an important addition to the Ordinance since previous research conducted by ERD has indicated that soluble nutrients are released rapidly from yard wastes upon entering a receiving waterbody within a period of approximately 7-10 days. Discharge of yard wastes onto paved surfaces is a clear violation of surface water quality standards.

7.6.2 Recommendations

The Fertilizer Ordinance, if fully observed, has a potential to substantially reduce water quality impacts from fertilizer and landscaping activities throughout Lake County. However, in spite of the ordinances, instances of improper fertilizer application and discharge of vegetation debris onto paved surfaces appear to be relatively routine activities. Therefore, ERD recommends that Lake County, and other designated agencies, be given authority to fully enforce the ordinances and issue citations when violations are observed during routine job-related activities. An educational pamphlet or brochure should be prepared and distributed to all homeowners and lawn maintenance companies within the Lake Yale and Trout Lake watersheds to inform them of the new regulations, and consequences for violations.

7.7 Boating Impacts

7.7.1 Existing Conditions and Issues

Lake Yale is used extensively for boating and recreational activities, particularly on weekends and during summer months, although boating on Trout Lake is much less common. Several previous research studies have been conducted to evaluate the impacts of boating and recreational activities on water quality in Central Florida lakes. One of the first studies on the impacts of motor boats on water quality in shallow lakes was conducted by Yousef, et al. (1980). The maximum engine size used in this study was 165 HP which was one of the largest engines available at that time. The study concluded that operation of this boat and engine combination caused resuspension of bottom sediments in water as deep as 10-15 ft. Virtually all motor boats operating on inland lakes today have engine horsepowers equal to or greater than the 165 HP units tested by Yousef, et al.

During the period from 2004-2006, ERD conducted an evaluation of water quality impacts from boating activities on the Butler Chain-of-Lakes as part of a hydrologic and nutrient budget evaluation on the Chain-of-Lakes. Boating activities on the Chain-of-Lakes were found to exhibit significant water quality impacts, particularly with respect to increases in particulate and total nutrients, as well as TSS. Statistically significant impacts of boating activities on water quality were observed in virtually all of the lakes. These impacts are presumably due to resuspension of bottom sediments during boating activities when the wake and prop disturbances created by the boat extend through the water column to the bottom sediments. Obviously, this impact is greater in shallow water and becomes less significant as the depth of water increases.

7.7.2 Recommendations

Based upon the results of the boating impact evaluation performed by ERD and the study performed by Yousef, et al., it is recommended that normal motor boating activities within Lake Yale and Trout Lake be restricted to water depths of approximately 10 ft or more. These areas should be clearly outlined within the lake using buoys, with no wake restrictions in force in areas between the buoys and the shoreline. The proposed 10-ft depth restriction for full-speed activities will also assist in establishing beneficial submerged vegetation within shoreline areas of the lakes, particularly in Lake Yale.

A new generation of ski and wakeboard boats have been developed which have onboard ballast tanks that can be filled with water to enhance the wake generated behind the boat. These types of boats have the potential to create water column disturbances to deeper depths than occur as a result of typical motor boating activities. Therefore, it is generally recommended that normal operation using these types of boats be limited to areas where the water depth is approximately 15 ft or more.

Diagrams indicating areas within Lake Yale and Trout Lake which are approximately 10 ft in depth or more are indicated on Figures 7-4 and 7-5, respectively, and represent the areas where full-speed boating using traditional boats would be allowed based upon these new recommendations. In Lake Yale, these areas include the vast majority of the lake, but in Trout Lake areas greater than 10 ft in depth are limited to a small area in the center and western portions of the lake.

Areas of water depth of approximately 15 ft or more in Lake Yale are indicated on Figure 7-6 and reflect portions of the lake which would be suitable for use by enhanced-wake boats. Areas of water depths of 15 ft or more in Lake Yale include only a small area on the south-central portion of the lake. A minimum water depth of 10 ft is recommended for normal boating activities in Lake Yale, with a minimum water depth of 15 ft for enhanced wake boating. There are no significant areas of Trout Lake with water depths in excess of 15 ft, so boating on Trout Lake should be limited to normal boating activities only, with no-wake conditions in water depths less than 10 ft. The use of wake boards in Trout Lake would result in significant disturbance and resuspension of bottom sediments and enhancement of shoreline erosion.

The recommendations outlined above are intended to apply to traditional motor boats only. Personal water craft use a jet propulsion system which discharges water horizontally just below the water surface. These types of water craft create very little vertical disturbance within the water column and do not necessarily need to be limited to the same water depths recommended for traditional boats. However, even personal water crafts should not be operated in water with depths less than 5-6 ft for both water quality and safety reasons. Therefore, it is recommended that non-idle operation of personal water craft be restricted to water depths in excess of 6 ft.

7.8 Water Quality Benefits from Evaluated Management Options

The anticipated water quality benefits of the proposed treatment options for Lake Yale and Trout Lake were evaluated using the calibrated water quality models discussed in Section 6 based upon the anticipated total phosphorus load reductions for the proposed projects. A comparison of modeled load reductions and water quality benefits for Lake Yale and Trout Lake is given in the following sections.

7.8.1 Lake Yale

A complete listing of the results of the water quality models used to evaluate anticipated benefits to Lake Yale from the evaluated treatment options for Lake Yale is given in Appendix K.1, and a summary of anticipated load reductions for the evaluated water quality improvement projects is given in Table 7-24. Phosphorus load reduction estimates are provided for the Sub-basins 12 and 13 treatment pond sediment inactivation. The estimated annual total phosphorus load reductions for the evaluated treatment options were input into the Lake Yale model to evaluate potential water quality impacts. A summary of the modeling results is given in Table 7-25.

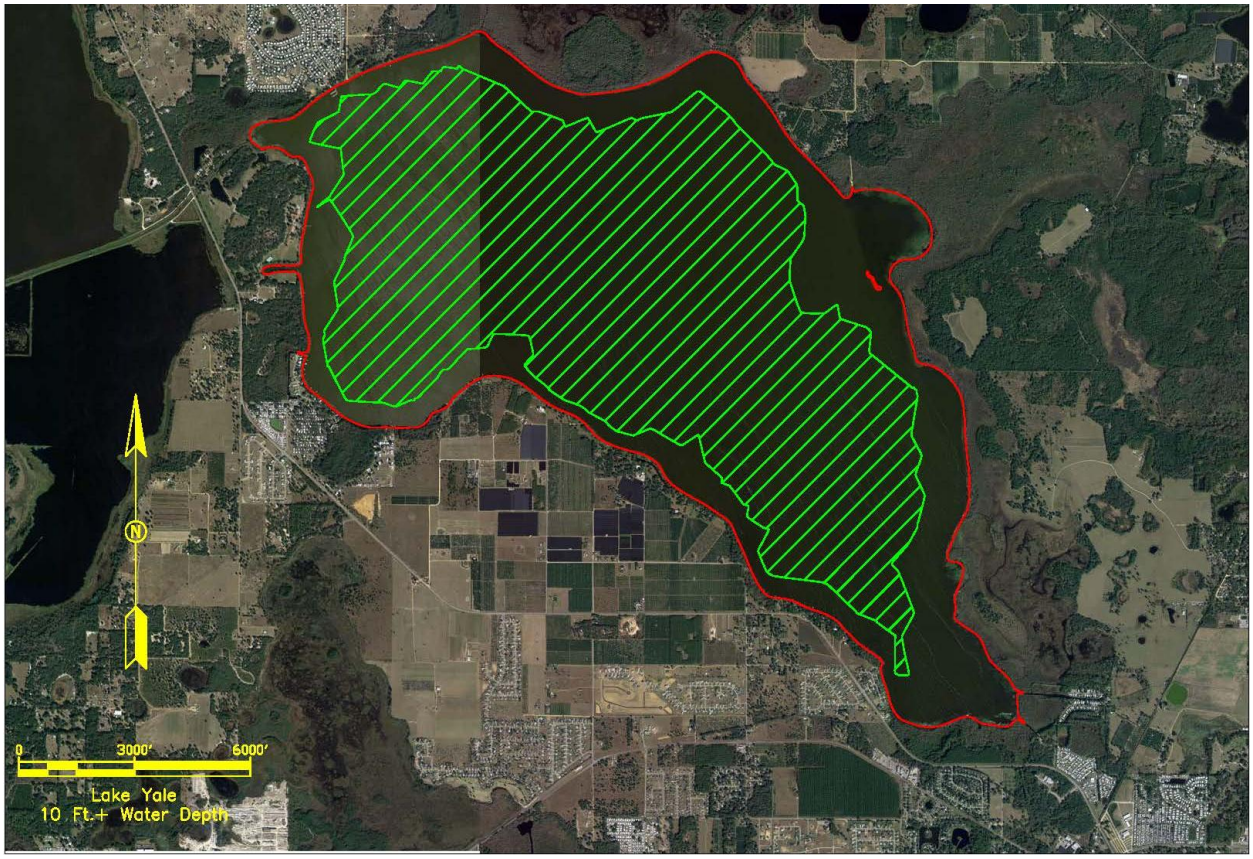


Figure 7-4. Areas in Lake Yale where the Water Depth is Greater than 10 ft.

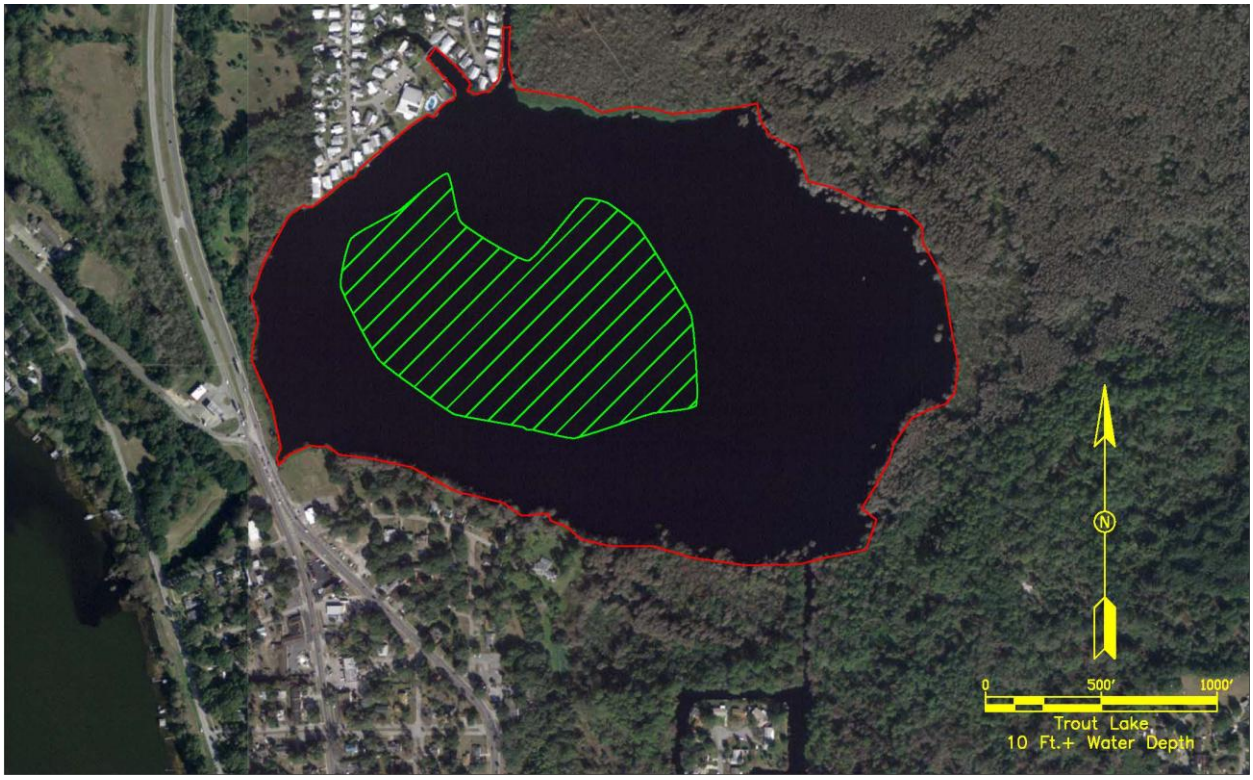


Figure 7-5. Areas in Trout Lake where the Water Depth is Greater than 10 ft.

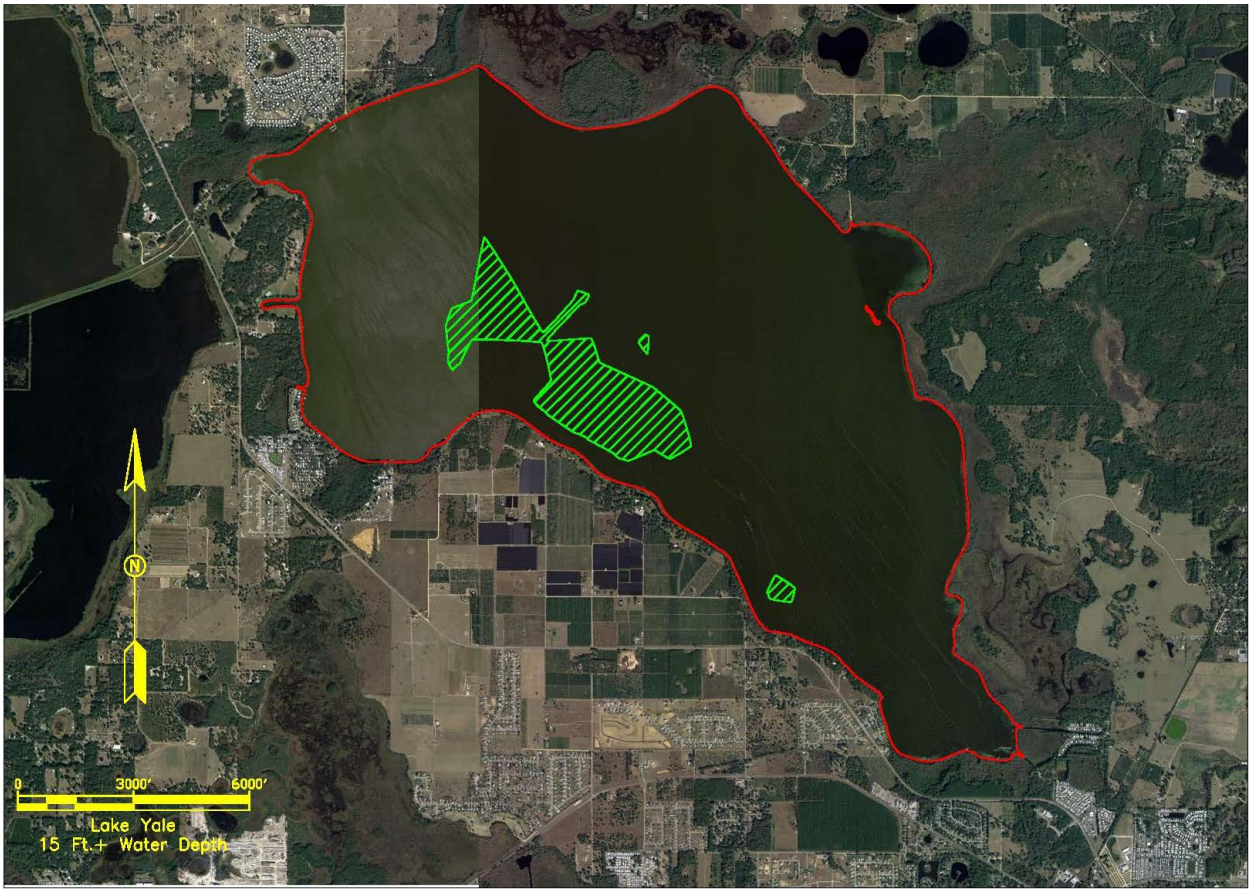


Figure 7-6. Areas in Lake Yale where the Water Depth is Greater than 15 ft.

TABLE 7-24

SUMMARY OF ANTICIPATED LOAD REDUCTIONS FOR EVALUATED WATER QUALITY IMPROVEMENT PROJECTS IN LAKE YALE

TREATMENT OPTION	CURRENT PHOSPHORUS LOAD (kg/yr)	ASSUMED TP LOAD REDUCTION (%)	PHOSPHORUS LOAD REDUCTION (kg/yr)	MODIFIED PHOSPHORUS LOAD (kg/yr)
Sub-basins 12 and 13 Pond	128.6	65	83.6	45.0
Sediment Inactivation	8,130[1]	80	6,054	1,596

1. Includes 7,981 kg/yr from internal recycling and 149 kg/yr from groundwater seepage

TABLE 7-25

MODELED WATER QUALITY BENEFITS FROM THE EVALUATED WATER QUALITY IMPROVEMENT OPTIONS FOR LAKE YALE

OPTION	MEAN TOTAL PHOSPHORUS CONCENTRATION (μg/l)	MEAN CHLOROPHYLL-A CONCENTRATION (mg/m^3)	MEAN SECCHI DISK DEPTH (m)	TSI VALUE
Existing Conditions	28	21.2	0.61	71
Sub-basins 12 and 13 Pond	28	21.0	0.62	70
Alum Sediment Inactivation	9	6.9	1.6	48
Alum Sediment Inactivation + Sub-basins 12 and 13 Pond	9	6.7	1.7	47

Implementation of the proposed detention pond for Sub-basins 12 and 13 would result in a relatively insignificant reduction in chlorophyll-a concentrations within Lake Yale and a minimal improvement in Secchi disk depth. Estimated TSI value would decrease from approximately 71 to 70.

A more significant improvement in water quality could be achieved through the proposed sediment inactivation project which would provide load reductions for total phosphorus originating from both internal recycling and groundwater seepage. Mean annual total phosphorus concentrations in Lake Yale would be reduced by approximately 68% from 28 μg/l under current conditions to 9 μg/l following sediment inactivation. Mean annual chlorophyll-a concentrations would be reduced by approximately 67% from 21.2 mg/m^3 under current conditions to 6.9 mg/m^3, and mean Secchi disk depth would improve substantially from 0.61 m to 1.6 m, with a reduction in TSI from 71 to 48, reflecting borderline oligotrophic-mesotrophic conditions. Implementation of alum sediment inactivation and the detention pond system for Sub-basins 12 and 13 would provide results similar to alum sediment inactivation alone.

7.8.2 Trout Lake

A complete listing of the results of water quality models used to evaluate anticipated benefits to Trout Lake from the evaluated treatment options is given in Appendix K.2, and a summary of the anticipated load reductions for the evaluated water quality improvement projects is given in Table 7-26. Phosphorus load reductions are provided for the Hicks Ditch chemical treatment system and the proposed sediment inactivation project to reduce phosphorus loadings from internal recycling and groundwater seepage. The estimated annual total phosphorus load reductions were input into the Trout Lake model to evaluate potential water quality impacts. A summary of the modeling results is given in Table 7-27.

TABLE 7-26

SUMMARY OF ANTICIPATED LOAD REDUCTIONS FOR EVALUATED WATER QUALITY IMPROVEMENT PROJECTS IN TROUT LAKE

TREATMENT OPTION	CURRENT PHOSPHORUS LOAD (kg/yr)	ASSUMED TP LOAD REDUCTION (%)	PHOSPHORUS LOAD REDUCTION (kg/yr)	MODIFIED PHOSPHORUS LOAD (kg/yr)
Hicks Ditch	156.5	75	117	39.5
Sediment Inactivation[1]	281	80	225	56.0

1. Includes 172 kg/yr from internal recycling and 109 kg/yr from groundwater seepage

TABLE 7-27

MODELED WATER QUALITY BENEFITS FROM THE EVALUATED WATER QUALITY IMPROVEMENT OPTIONS FOR TROUT LAKE

OPTION	MEAN TOTAL PHOSPHORUS CONCENTRATION (μg/l)	MEAN CHLOROPHYLL-A CONCENTRATION (mg/m^3)	MEAN SECCHI DISK DEPTH (m)	TSI VALUE
Existing Conditions	216	57.6	0.60	92
Hicks Ditch BMP	170	44.8	0.77	87
Sediment Inactivation	120	31.2	1.07	79
Hicks Ditch + Sediment Inactivation	75	18.8	1.70	68

Implementation of the Hicks Ditch treatment system would result in a decrease in mean annual total phosphorus concentrations from 216 μg/l to 170 μg/l, a decrease in mean chlorophyll-a from 57.6 mg/m^3 to 44.8 mg/m^3, and an increase in Secchi disk depth from 0.60 m to 0.77 m, although the lake would still maintain hypereutrophic conditions. However, since algal productivity in Trout Lake is likely regulated by color, a significant reduction in color by the treatment system may actually increase algal growth in Trout Lake unless SRP concentrations can be maintained at growth-limiting values.

Conducting the proposed sediment inactivation project, which will reduce loadings from both internal recycling and groundwater seepage, will reduce total phosphorus concentrations from 216 μg/l to 120 μg/l, chlorophyll-a from 57.6 mg/ m^3 to 31.2 mg/ m^3, and improve water clarity from 0.60 m to 1.07 m. The most significant improvements in water quality in Trout Lake can be achieved by implementing both the Hicks Ditch treatment system and the proposed sediment inactivation which will reduce total phosphorus concentrations by 65% from 216 μg/l to 75 μg/l, chlorophyll-a by 67% from 57.6 mg/ m^3 to 18.8 mg/ m^3, and improve water clarity.

7.9 Recommendations

Recommended water quality management options for Lake Yale and Trout Lake are provided in the following sections based on the information and analyses contained in previous sections.

7.9.1 Lake Yale

A summary of recommended water quality management options for Lake Yale is given in Table 2-28. ERD currently recommends construction of the proposed treatment pond for Sub-basins 12 and 13, provided that the project could be constructed at an acceptable cost. The sources of elevated total phosphorus concentrations originating from Sub-basin 14 should also be investigated. Although not recommended at this time for existing shoreline properties, construction of rear yard berms and swales should be required for all future shoreline development which occurs on Lake Yale. Efforts should also be undertaken to continue management of tussocks on an as-needed basis, preferably using mechanical means to prevent additional accumulation of organic matter on the lake bottom. Maintaining long-term stable and improved water quality in Lake Yale is highly dependent on re-establishment of the submerged vegetation communities, which will likely re-colonize naturally as proposed water quality improvement projects reduce phosphorus concentrations and algal productivity within the lake. One of the most significant components to reduce total phosphorus concentrations in Lake Yale is the proposed sediment inactivation project which will provide significant load reductions for inputs resulting from internal recycling and groundwater seepage, and ERD recommends that this activity be given high priority.

TABLE 7-28

RECOMMENDED MANAGEMENT OPTIONS FOR LAKE YALE

ISSUE	RECOMMENDATION
Treatment of Stormwater Inputs	a. Construct treatment pond option for Sub-basins 12 and 13 (if feasible)
	b. Evaluate sources of elevated total phosphorus concentrations originating from Sub-basin 14
Rear Yard Berms and Swales	a. Require construction of berms and swales for all future shoreline development in Lake Yale
Vegetation Control	a. Continue to manage tussocks as needed, preferably using mechanical means
Re-vegetation	a. Allow submerged vegetation to recolonize as water column clears
Internal Recycling/ Groundwater Seepage Inputs	a. Conduct a whole-lake alum treatment to control internal recycling and remove phosphorus from seepage inflows
Lawn Maintenance Activities	a. Conduct education and enforcement for new fertilizer ordinance
Public Education	a. Initiate public education program to inform residents of link between watershed activities and water quality
Boating	a. Restrict normal boating activities to areas >10 ft in depth; 15 ft for enhanced wake boats; 6 ft for jet skis; idle speed in all other areas

The newly enacted fertilizer ordinance will provide guidance for both residential and commercial fertilizer applicators to minimize impacts of fertilizer on receiving waterbodies. ERD recommends that Lake County implement an education and enforcement program to enhance the effectiveness of the new ordinance. The education program should inform residents of the links between watershed activities and surface water quality. In addition, normal boating activities in Lake Yale should be restricted to areas with a water depth in excess of 10 ft, increasing to 15 ft for enhanced wake boats.

7.9.2 Trout Lake

A summary of recommended management options for Trout Lake is given in Table 7-29. The two most significant projects with the potential for improving water quality characteristics in Trout Lake are the current Hicks Ditch chemical treatment system and sediment inactivation to control phosphorus loadings from internal recycling and groundwater seepage. However, as mentioned previously, if the proposed Hicks Ditch stormwater treatment project results in a substantial reduction in color in Trout Lake, algal productivity may increase rather than decrease as a result of this project until in-lake total phosphorus concentrations can be reduced to limiting values. The proposed whole-lake alum treatment project for Trout Lake is relatively inexpensive and would provide a significant annual total phosphorus load reduction.

TABLE 7-29

RECOMMENDED MANAGEMENT OPTIONS FOR TROUT LAKE

ISSUE	RECOMMENDATION
Treatment of Stormwater Inputs	a. Complete current alum treatment system for Hicks Ditch
Rear Yard Berms and Swales	a. Construct berms and swales for future development along shoreline areas of Trout Lake
Vegetation Control	a. Control nuisance vegetation along shoreline
Internal Recycling/ Groundwater Seepage Inputs	a. Conduct a whole-lake alum treatment to control internal recycling and remove phosphorus from seepage inflows
Lawn Maintenance Activities	a. Conduct education and enforcement for new fertilizer ordinance
Public Education	a. Initiate public education program to inform residents of link between watershed activities and water quality
Boating	a. Restrict normal boating activities to areas >10 ft in depth; 6 ft for jet skis; idle speed in all other areas

In addition to the significant water quality improvements mentioned previously, ERD also recommends multiple smaller projects and activities that provide relatively low cost phosphorus load reductions for lakes. One of these recommended activities is rear yard berms and swales. Under current conditions, there are relatively few shoreline developments adjacent to Trout Lake. However, ERD recommends that berms and swales be required for future development to reduce phosphorus loadings from rear yard areas. In addition, multiple shoreline areas along Trout Lake are currently vegetated with nuisance and/or exotic vegetation, and ERD recommends that control measures be implemented to reduce and control this vegetation. Education and enforcement should also be conducted for the new fertilizer ordinance to inform residents of the link between watershed activities and water quality in lakes. Finally, boating activities in Trout Lake should be restricted to normal boating only in areas of the lake with a water depth greater than 10 ft. Boating activities using wake boats should not be conducted in Trout Lake due to the significant potential for resuspension and redistribution of organic sediments within the lake.

SECTION 8

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APPENDICES

APPENDIX A

PHOTOGRAPHS OF SEDIMENT CORE SAMPLES

A.1 Trout Lake
A.2 Lake Yale

A.1 Trout Lake



Trout Site 1



Trout Site 2



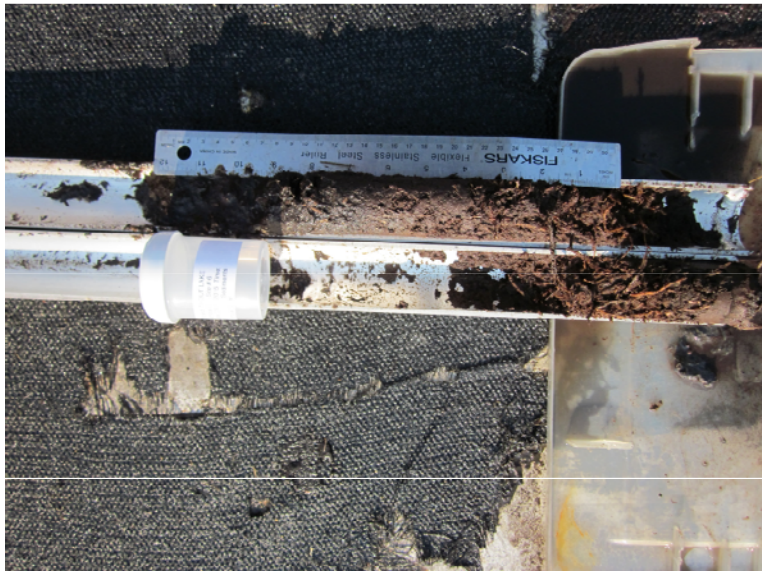
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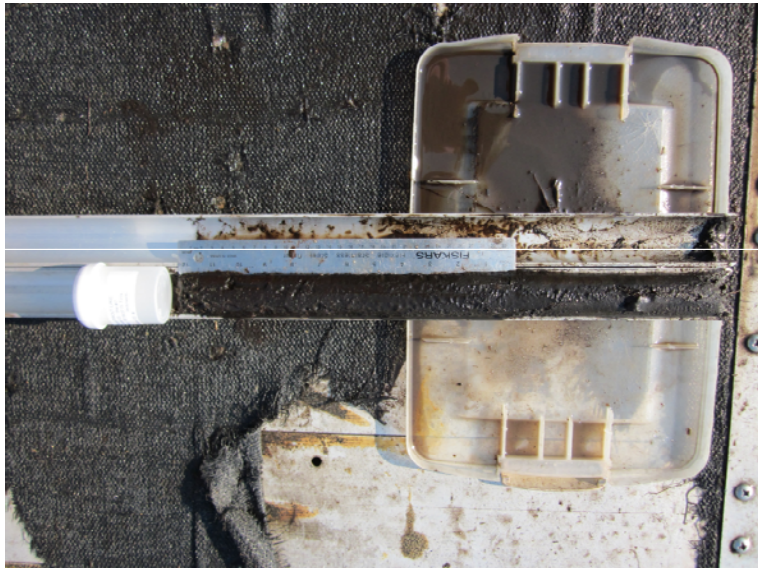
Trout Site 4



Trout Site 5



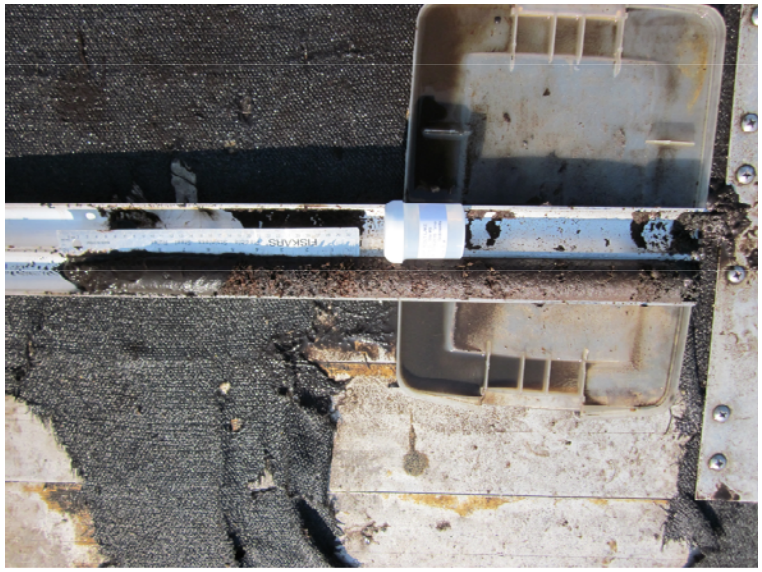
Trout Site 6



Trout Site 7



Trout Site 8



Trout Site 9



Trout Site 10



Yale Site 11



Yale Site 12



Trout Site 13



Trout Site 14



Trout Site 15

A.2 Lake Yale



Yale Site 1



Yale Site 2



Yale Site 3



Yale Site 4



Yale Site 5



Yale Site 6



Yale Site 7



Yale Site 8



Yale Site 9



Yale Site 10



Yale Site 11



Yale Site 12



Yale Site 13



Yale Site 14



Yale Site 15



Yale Site 16



Yale Site 17



Yale Site 18



Yale Site 19



Yale Site 20



Yale Site 21



Yale Site 22



Yale Site 23



Yale Site 25



Yale Site 25



Yale Site 26



Yale Site 27



Yale Site 28



Yale Site 29



Yale Site 30



Yale Site 31



Yale Site 32

APPENDIX B

HISTORICAL WATER QUALITY DATA FOR TROUT LAKE

B.1 LakeWatch Data
B.2 SJRWMD Data

B.1 LakeWatch Data

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-1	2/11/93	1,510	165	94.0			0.76	9	82
	3/11/93	1,570	157	83.0			0.61	10	80
	4/12/93	2,420	192	151			0.40	13	89
	5/11/93	2,020	266	44.0			0.85	8	71
	6/11/93	2,410	296	193			0.46	8	93
	7/9/93	1,820	360	91.0			0.76	5	82
	8/10/93	2,060	288	129			0.61	7	87
	9/11/93	1,700	204	80.0			0.61	8	80
	10/11/93	1,700	133	98.0			0.55	13	83
	11/13/93	1,830	103	97.0			0.70	18	83
	12/16/93	1,620	100	65.0			0.61	16	77
	1/12/94	1,480	99	75.0			0.70	15	79
	2/15/94	1,500	130	79.0			0.76	12	80
	3/17/94	1,560	113	68.0			0.46	14	78
	4/15/94	1,780	143	81.0			0.55	12	80
	5/13/94	1,960	156	109			0.49	13	84
	6/11/94	2,180	173	127			0.40	13	87
	7/13/94	2,290	123	133			0.40	19	87
	8/20/94	1,850	95	125			0.55	19	86
	9/14/94	1,800	102	94.0			0.46	18	82
	10/13/94	1,870	166	27.0			0.55	11	64
	11/23/94	1,390	178	5.0			0.34	8	40
	12/16/94	1,350	173	5.0			0.46	8	40
	1/13/95	1,250	133	42.0			0.61	9	71
	2/13/95	1,270	100	32.0			0.70	13	67
	3/18/95	1,110	124	133			0.61	9	87
	4/20/95	1,270	168	21.0			0.55	8	61
	5/13/95	1,450	210	46.0			0.70	7	72
	6/12/95	1,450	179	56.0			0.85	8	75
	7/8/95	1,600	133	99.0			0.55	12	83
	8/16/95	1,550	120	76.0			0.61	13	79
	9/16/95	1,360	135	63.0			0.52	10	76
	10/14/95	1,340	150	37.0			0.46	9	69
	11/16/95	1,380	113	25.0			0.46	12	63
	12/18/95	1,250	80	35.0			0.55	16	68
	1/16/96	1,220	122	23.0			0.49	10	62
	2/15/96	1,220	112	34.0			0.76	11	68
	3/20/96	1,370	157	48.0			0.55	9	73
	4/24/96	1,250	176	27.0			0.55	7	64
	5/18/96	1,580	219	66.0			0.46	7	77
	6/13/96	1,340	212	66.0			0.61	6	77
	7/12/96	1,410	195	63.0			0.61	7	76
	8/21/96	1,280	183				0.61	7	
	9/26/96	1,410	121	52.0			0.55	12	74
	10/16/96	1,310	133	45.0			0.46	10	72
	11/21/96	1,860	102	34.0			0.46	18	68
	12/16/96	1,130	93	32.0			0.61	12	67
	1/18/97	1,240	117	34.0			0.70	11	68
	2/25/97	1,260	101	55.0			0.46	12	75
	3/22/97	1,590	149	41.0			0.55	11	70
	4/19/97	1,580	153	64.0			0.55	10	77
	5/15/97	1,620	194	94.0			0.46	8	82
	6/16/97	1,660	204	97.0			0.46	8	83
	7/17/97	1,950	169	122			0.46	12	86
	8/15/97	1,670	128	83.0			0.55	13	80
	9/18/97	1,940	98	106.0			0.55	20	84
	10/20/97	1,580	89	63.0			0.61	18	76

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-1	11/17/97	1,400	75	56.0			0.55	19	75
	12/18/97	1,260	83	25.0			0.61	15	63
	1/22/98	1,610	184	51.0			0.46	9	73
	2/21/98	1,880	221	163			0.46	9	90
	3/23/98	1,400	212	8.0			0.46	7	47
	4/14/98	1,690	250	9.0			0.46	7	48
	5/23/98	1,810	257	11.0			0.46	7	51
	6/16/98	1,630	270	60.0			0.40	6	76
	7/17/98	1,420	246	26.0			0.46	6	64
	8/15/98	1,680	326	38.0			0.46	5	69
	10/24/98	1,530	202	16.0			0.46	8	57
	11/17/98	1,610	155	15.0			0.55	10	56
	12/22/98	1,750	191	15.0			0.76	9	56
	1/20/99	1,740	218	25.0			0.76	8	63
	2/17/99	1,580	260	77.0			0.70	6	79
	3/17/99	1,630	236	43.0			0.61	7	71
	4/19/99	1,490	305	51.0			0.46	5	73
	5/24/99	1,610	264	60.0			0.61	6	76
	6/19/99	1,420	369	81.0			0.46	4	80
	7/15/99	1,540	256	88.0			0.46	6	81
	8/14/99	1,670	186	59.0			0.46	9	76
	10/12/99	1,710	194	57.0			0.40	9	75
	11/18/99	1,630	161	15.0			0.46	10	56
	12/16/99	1,660	166	17.0			0.40	10	58
	1/20/00	1,740	150	10.0			0.46	12	50
	2/22/00	1,610	158	36.0			0.61	10	68
	3/22/00	1,720	146	31.0			0.55	12	66
	4/15/00	2,090	199	59.0			0.40	11	76
	5/23/00	1,860	363	80.0			0.40	5	80
	6/17/00	2,150	389	162			0.40	6	90
	7/14/00	2,180	425	148			0.30	5	89
	8/18/00	2,720	337	154			0.40	8	89
	9/12/00	2,880	322	198			0.30	9	93
	10/24/00	2,260	175	171			0.30	13	91
	11/15/00	2,880	189	187			0.30	15	92
	12/16/00	2,690	178	148			0.30	15	89
	1/24/01	2,240	191	155	65		0.30	12	89
	3/21/01	2,040	274	115			0.30	7	85
	4/20/01	3,440	368	220	59		0.30	9	94
	5/23/01	1,830	422	131			0.30	4	87
	6/20/01	3,210	475	193			0.24	7	93
	7/16/01	3,260	409	239			0.24	8	96
	8/14/01	3,740	404	231			0.27	9	95
	9/18/01	3,080	253	159			0.27	12	90
	10/18/01	2,970	386	63.0	545		0.24	8	76
	11/13/01	2,070	279	38.0			0.24	7	69
	12/11/01	3,000	298	11.0			0.30	10	51
	1/15/02	1,970	261	7.0	390		0.30	8	45
	2/12/02	2,810	321	5.0			0.40	9	40
	3/13/02	2,620	361	10.0			0.46	7	50
	4/17/02	2,080	391	73.0	224		0.46	5	79
	5/15/02	2,330	621	77.0			0.30	4	79
	6/12/02	2,680	561	147			0.30	5	89
	7/16/02	2,270	387	36.0	488		0.30	6	68
	8/21/02	2,190	385	5.0			0.24	6	40
	9/18/02	1,630	364	3.0			0.18	4	33
	10/15/02	1,780	338	2.0	584		0.21	5	27

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-1	11/13/02	2,360	278	3.0			0.24	8	33
	12/18/02	1,930	220	3.0			0.27	9	33
	1/15/03	1,640	200	7.0	313		0.30	8	45
	2/12/03	2,030	293	12.0			0.46	7	53
	3/19/03	1,900	372	61.0			0.30	5	76
	4/16/03	1,870	264	35.0	338		0.30	7	68
	5/14/03	3,820	330	3.0			0.30	12	33
	6/17/03	1,900	300	24.0			0.46	6	63
	7/2/03	1,740	294	11.0	320		0.46	6	51
	8/13/03	1,480	247	9.0			0.30	6	48
	9/10/03	1,430	242	8.0			0.30	6	47
	10/15/03	1,670	239	3.0			0.30	7	33
	11/12/03	1,660	205	7.0			0.30	8	45
	12/19/03	1,810	248	3.0			0.40	7	33
	1/14/04	2,170	343	4.0	208		0.46	6	37
	2/18/04	1,950	401	17.0			0.61	5	58
	3/10/04	1,860	388	54.0			0.55	5	74
	4/21/04	1,640	475	73.0	137		0.46	3	79
	5/12/04	1,890	545	48.0			0.61	3	73
	6/16/04	1,940	415	122			0.46	5	86
	7/14/04	2,470	445	168	77		0.30	6	91
	8/18/04	2,180	313	120			0.30	7	86
	9/15/04	2,410	337	80.0			0.30	7	80
	10/13/04	2,350	352	46.0	393		0.30	7	72
	11/17/04	1,780	162	36.0			0.46	11	68
	12/15/04	2,340	184	14.0			0.46	13	55
	1/19/05	2,150	200	18.0	208		0.46	11	58
	2/16/05	2,130	193	55.0			0.46	11	75
	3/11/05	2,080	201	23.0			0.61	10	62
	4/20/05	1,610	77	72.0	196		0.30	21	78
	5/10/05	1,850	303	58.0			0.40	6	75
	6/15/05	1,860	335	70.0			0.46	6	78
	7/14/05	1,610	304	73.0	147		0.40	5	79
	8/16/05	1,630	235	69.0			0.46	7	78
	9/28/05	1,580	186	83.0			0.40	8	80
	10/12/05	2,670	178	10.0	217		0.46	15	50
	11/15/05	1,440	163	71.0			0.55	9	78
	12/14/05	1,510	147	7.0			0.61	10	45
	1/25/06	3,250	189	77.0			0.61	17	79
	2/22/06	2,030	251	264	163		0.55	8	97
	3/15/06	4,000	299	42.0			0.91	13	71
	4/19/06	1,760	307	76.0	152		0.46	6	79
	5/24/06	1,620	335	73.0			0.46	5	79
	6/21/06	1,770	357	63.0			0.40	5	76
	7/14/06	3,170	448	253	133		0.30	7	96
	8/16/06	1,750	345	75.0			0.46	5	79
	9/13/06	1,860	224	116.0			0.46	8	85
	10/19/06	2,300	167		67		0.30	14	
	11/15/06	2,040	137	124			0.30	15	86
	12/13/06	2,620	178	176			0.24	15	91
	1/17/07	2,110	172	84.0	56	166	0.30	12	81
	2/14/07	1,720	131	81.0			0.46	13	80
	3/21/07	2,280	160	127			0.46	14	87
	4/11/07	2,500	180	128	50	177	0.24	14	87
	5/16/07	2,560	164	114			0.30	16	85
	6/13/07	2,480	192	187			0.30	13	92
	8/22/07	3,000	171	176	68	178	0.15	18	91

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-1	9/12/07	2,720	175	146			0.24	16	89
	10/15/07	2,100	139	104	51	167	0.40	15	84
	11/12/07	1,730	106	72.8			0.30	16	79
	12/12/07	2,060	123	102			0.30	17	83
	1/14/08	1,940	151	111	42	188	0.30	13	85
	2/11/08	3,340	147	131			0.30	23	87
	3/12/08	2,060	144	118			0.30	14	85
	4/16/08	2,610	179	157	50	163	0.24	15	90
	5/14/08	3,030	187	170			0.15	16	91
	6/18/08	3,130	196	193			0.24	16	93
	7/9/08	2,940	189	214	53		0.24	16	94
	8/13/08	2,850	175	173			0.30	16	91
	9/3/08	2,830	396	56.0			0.24	7	75
	10/15/08	4,140	434	3.0	829	167	0.15	10	33
	11/19/08	3,710	307	2.0	772	171	0.15	12	27
	12/17/08	4,270	317	3.0			0.15	13	33
	1/19/09	3,770	313	5.0	488	153	0.30	12	40
	2/18/09	1,960	282	9.0			0.15	7	48
	3/18/09	3,940	420	11.0			0.15	9	51
	4/15/09	4,220	422	12.5	414	205	0.24	10	53
	5/13/09	3,350	448	97.0			0.15	7	83
	6/19/09	1,620	430	7.0			0.24	4	45
	7/15/09	1,400	309	4.0	274	104	0.24	5	37
	8/19/09	2,530	285	8.0			0.24	9	47
	9/4/09	1,370	213	7.0			0.24	6	45
	10/14/09	2,150	247	7.0	393	100	0.24	9	45
	11/18/09	2,290	200	4.0			0.15	11	37
	12/16/09	2,280	181	3.0			0.24	13	33
	1/20/10	2,470	203	6.0	317	131	0.30	12	43
	2/24/10	2,570	267	5.0			0.30	10	40
	3/17/10	2,010	249	13.0			0.40	8	54
	4/28/10	1,840	335	23.0	293	118	0.46	5	62
	5/12/10	2,020	419	19.0			0.30	5	59
	6/16/10	2,970	409	179			0.24	7	91
	7/23/10				313	88			
	8/18/10	1,650	221	7.6			0.30	7	46
	9/1/10	1,890	212	6.7			0.24	9	44
	10/20/10	1,940	164	6.0	255	111	0.30	12	43
	11/17/10	1,730	175	31.0	234	120	0.30	10	66
	12/22/10	1,890	202	8.0	180	138	0.30	9	47
	1/19/11	2,050	311	26.0	170	155	0.46	7	64
	3/16/11	2,210	460	111	140	167	0.46	5	85
	5/11/11	1,280	385	41.6	115	180	0.61	3	70
	7/20/11	2,180	220	141	67	213	0.30	10	88
	8/17/11	2,860	343	188	57	207	0.30	8	92
	9/21/11	2,710	357	135	42	197	0.30	8	87
	10/12/11	3,530	300	200	71	201	0.24	12	93
	11/16/11	2,610	201	116	62	228	0.15	13	85
	12/14/11	1,980	127	108	47	243	0.24	16	84
Minimum Value:		**1,110**	**75**	**2**	**42**	**88**	**0.15**	**3**	**27**
Maximum Value:		**4,270**	**621**	**264**	**829**	**243**	**0.91**	**23**	**97**
Geometric mean:		**1,959**	**218**	**41**	**160**	**159**	**0.39**	**9**	**68**

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-2	2/11/93	1,430	153	59.0			0.85	9	76
	3/11/93	1,720	171	103			0.61	10	84
	4/12/93	2,480	189	168			0.46	13	91
	5/11/93	2,040	269	59.0			0.61	8	76
	6/11/93	3,640	372	360			0.40	10	102
	7/9/93	1,860	352	89.0			0.70	5	81
	8/10/93	1,940	275	135			0.61	7	87
	9/11/93	1,690	193	69.0			0.70	9	78
	10/11/93	1,670	130	96.0			0.55	13	83
	11/13/93	1,660	93	94.0			0.70	18	82
	12/16/93	1,270	99	68.0			0.61	13	78
	1/12/94	1,590	110	79.0			0.70	14	80
	2/15/94	1,570	134	81.0			0.61	12	80
	3/17/94	1,580	114	67.0			0.55	14	77
	4/15/94	1,720	136	81.0			0.52	13	80
	5/13/94	2,120	146	112			0.49	15	85
	6/11/94	2,100	169	128			0.30	12	87
	7/13/94	2,310	138	131			0.40	17	87
	8/20/94	1,820	89	134			0.55	20	87
	9/14/94	1,840	108	99.0			0.46	17	83
	10/13/94	1,880	166	30.0			0.46	11	66
	11/23/94	1,440	186	5.0			0.46	8	40
	12/16/94	1,460	175	4.0			0.46	8	37
	1/13/95	1,200	127	34.0			0.55	9	68
	2/13/95	1,240	96	25.0			0.70	13	63
	3/18/95	1,350	137	106			0.61	10	84
	4/20/95	1,420	178	43.0			0.55	8	71
	5/13/95	1,550	215	81.0			0.70	7	80
	6/12/95	1,380	173	41.0			0.85	8	70
	7/8/95	1,760	145	107			0.55	12	84
	8/16/95	1,580	124	82.0			0.55	13	80
	9/16/95	1,340	134	56.0			0.52	10	75
	10/14/95	1,350	151	33.0			0.46	9	67
	11/16/95	1,460	114	25.0			0.46	13	63
	12/18/95	1,250	81	37.0			0.58	15	69
	1/16/96	1,220	120	27.0			0.46	10	64
	2/15/96	1,120	111	35.0			0.76	10	68
	3/20/96	1,410	152	51.0			0.55	9	73
	4/24/96	1,160	179	27.0			0.55	6	64
	5/18/96	1,590	225	70.0			0.46	7	78
	6/13/96	1,400	209	62.0			0.61	7	76
	7/12/96	1,430	196	46.0			0.61	7	72
	8/21/96	1,320	172				0.61	8	
	9/26/96	1,490	132	48.0			0.55	11	73
	10/16/96	1,190	136	45.0			0.55	9	72
	11/21/96	1,830	96	31.0			0.55	19	66
	12/16/96	1,100	94	32.0			0.61	12	67
	1/18/97	1,220	116	40.0			0.61	11	70
	2/25/97	1,300	101	55.0			0.55	13	75
	3/22/97	1,590	152	40.0			0.55	10	70
	4/19/97	1,620	157	68.0			0.55	10	78
	5/15/97	1,640	200	100			0.46	8	83
	6/16/97	1,910	246	109			0.40	8	84
	7/17/97	1,840	148	109			0.46	12	84
	8/15/97	1,600	111	74.0			0.55	14	79
	9/18/97	1,830	102	114			0.55	18	85
	10/20/97	1,540	88	68.0			0.70	18	78

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-2	11/17/97	1,400	74	57.0			0.61	19	75
	12/18/97	1,320	83	26.0			0.61	16	64
	1/22/98	1,600	183	31.0			0.46	9	66
	2/21/98	1,620	186	112			0.46	9	85
	3/23/98	1,420	217	8.0			0.46	7	47
	4/14/98	1,770	264	7.0			0.46	7	45
	5/23/98	1,840	272	16.0			0.46	7	57
	6/16/98	1,600	268	85.0			0.46	6	81
	7/17/98	1,450	245	31.0			0.55	6	66
	8/15/98	1,770	313	30.0			0.40	6	66
	10/24/98	1,600	206	17.0			0.46	8	58
	11/17/98	1,280	169	30.0			0.55	8	66
	12/22/98	1,720	191	16.0			0.76	9	57
	1/20/99	1,740	226	27.0			0.61	8	64
	2/17/99	1,570	254	45.0			0.70	6	72
	3/17/99	1,650	235	45.0			0.61	7	72
	4/19/99	1,520	317	55.0			0.46	5	75
	5/24/99	1,660	271	69.0			0.61	6	78
	6/19/99	1,370	364	78.0			0.46	4	80
	7/15/99	1,360	269	68.0			0.46	5	78
	8/14/99	1,670	199	61.0			0.46	8	76
	10/12/99	1,800	202	64.0			0.40	9	77
	11/18/99	1,670	162	15.0			0.46	10	56
	12/16/99	1,690	168	16.0			0.40	10	57
	1/20/00	1,500	158	10.0			0.46	9	50
	2/22/00	1,600	163	42.0			0.61	10	71
	3/22/00	1,770	144	30.0			0.55	12	66
	4/15/00	1,940	211	85.0			0.46	9	81
	5/23/00	1,790	338	75.0			0.40	5	79
	6/17/00	2,180	402	168			0.40	5	91
	7/14/00	2,320	419	156			0.30	6	90
	8/18/00	2,930	339	168			0.40	9	91
	9/12/00	2,840	323	214			0.30	9	94
	10/24/00	2,060	171	184			0.30	12	92
	11/15/00	2,900	193	197			0.30	15	93
	12/16/00	2,560	187	140			0.40	14	88
	1/24/01	2,290	197	169			0.30	12	91
	3/21/01	2,130	260	124			0.30	8	86
	4/20/01	3,220	374	236			0.24	9	95
	5/23/01	2,030	415	129			0.30	5	87
	6/20/01	3,300	486	214			0.24	7	94
	7/16/01	3,360	399	238			0.24	8	96
	8/14/01	3,810	394	227			0.27	10	95
	9/18/01	2,800	260	187			0.27	11	92
	10/18/01	2,990	387	65.0			0.24	8	77
	11/13/01	2,250	282	29.0			0.24	8	65
	12/11/01	2,850	291	10.0			0.30	10	50
	1/15/02	3,010	315	4.0			0.30	10	37
	2/12/02	3,060	322	21.0			0.40	10	61
	3/13/02	2,560	340	12.0			0.46	8	53
	4/17/02	2,240	394	43.0			0.46	6	71
	5/15/02	2,170	624	79.0			0.34	3	80
	6/12/02	2,720	571	134			0.30	5	87
	7/16/02	2,540	373	35.0			0.30	7	68
	8/21/02	1,800	392	4.0			0.24	5	37
	9/18/02	2,260	361	4.0			0.18	6	37
	10/15/02	1,950	337	4.0			0.21	6	37

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-2	11/13/02	2,200	283	3.0			0.24	8	33
	12/18/02	2,000	216	3.0			0.27	9	33
	1/15/03	1,660	203	7.0			0.30	8	45
	2/12/03	1,810	301	19.0			0.46	6	59
	3/19/03	2,000	361	94.0			0.30	6	82
	4/16/03	1,900	269	29.0			0.30	7	65
	5/14/03	3,730	333	3.0			0.30	11	33
	6/17/03	1,900	300	21.0			0.46	6	61
	7/2/03	1,630	294	13.0			0.43	6	54
	8/13/03	1,760	250	8.0			0.30	7	47
	9/10/03	1,460	243	5.0			0.30	6	40
	10/15/03	1,690	237	3.0			0.30	7	33
	11/12/03	1,500	208	5.0			0.30	7	40
	12/19/03	1,860	242	3.0			0.46	8	33
	1/14/04	2,200	350	5.0			0.46	6	40
	2/18/04	1,930	409	17.0			0.55	5	58
	3/10/04	1,930	409	50.0			0.55	5	73
	4/21/04	1,630	481	67.0			0.46	3	77
	5/12/04	1,460	541	43.0			0.61	3	71
	6/16/04	1,460	408	91.0			0.46	4	82
	7/14/04	2,630	457	186			0.30	6	92
	8/18/04	2,020	318	115			0.30	6	85
	9/15/04	2,530	342	83.0			0.30	7	80
	10/13/04	2,260	333	33.0			0.30	7	67
	11/17/04	1,840	170	40.0			0.46	11	70
	12/15/04	2,470	188	15.0			0.46	13	56
	1/19/05	2,190	197	13.0			0.46	11	54
	2/16/05	2,150	196	45.0			0.46	11	72
	3/11/05	1,970	214	28.0			0.61	9	65
	4/20/05	1,650	74	75.0			0.30	22	79
	5/10/05	1,950	310	59.0			0.40	6	76
	6/15/05	1,430	303	62.0			0.46	5	76
	7/14/05	1,680	317	138			0.40	5	88
	8/16/05	1,470	228	61.0			0.46	6	76
	9/28/05	1,520	194	95.0			0.40	8	82
	10/12/05	2,650	183	11.0			0.46	14	51
	11/15/05	1,460	150	42.0			0.61	10	71
	12/14/05	1,520	148	9.0			0.70	10	48
	1/25/06	3,670	195	67.0			0.61	19	77
	2/22/06	1,690	233	120			0.55	7	86
	3/15/06	4,120	303	44.0			0.85	14	71
	4/19/06	1,790	329	108			0.46	5	84
	5/24/06	1,620	318	63.0			0.46	5	76
	6/21/06	1,750	363	69.0			0.40	5	78
	7/14/06	2,900	427	225			0.30	7	95
	8/16/06	1,640	328	77.0			0.46	5	79
	9/13/06	1,880	216	114			0.46	9	85
	10/19/06	2,120	150				0.30	14	
	11/15/06	2,060	137	112			0.30	15	85
	12/13/06	2,500	169	171			0.24	15	91
	1/17/07	2,040	167	88.0			0.30	12	81
	2/14/07	1,680	127	80.0			0.46	13	80
	3/21/07	2,370	170	128			0.46	14	87
	4/11/07	2,460	175	128			0.24	14	87
	5/16/07	2,230	151	105			0.30	15	84
	6/13/07	2,460	196	190			0.24	13	92
	8/22/07	2,920	170	181			0.15	17	92

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-2	9/12/07	2,850	180	140			0.24	16	88
	10/15/07	2,150	138	103			0.40	16	83
	11/12/07	1,850	109	74.8			0.30	17	79
	12/12/07	2,170	131	129			0.30	17	87
	1/14/08	1,850	136	105			0.30	14	84
	2/11/08	3,300	140	132			0.30	24	87
	3/12/08	2,110	145	124			0.30	15	86
	4/16/08	2,530	176	154			0.24	14	89
	5/14/08	3,120	191	176			0.15	16	91
	6/18/08	3,040	186	194			0.24	16	93
	7/9/08	2,800	191	211			0.24	15	94
	8/13/08	2,830	178	176			0.30	16	91
	9/3/08	2,770	398	52.0			0.24	7	74
	10/15/08	4,150	426	3.0			0.15	10	33
	11/19/08	4,410	345	3.0			0.15	13	33
	12/17/08	4,330	319	3.0			0.15	14	33
	1/19/09	4,870	396	6.0			0.30	12	43
	2/18/09	2,610	398	8.0			0.15	7	47
	3/18/09	4,320	435	12.0			0.15	10	53
	4/15/09	4,070	431	13.3			0.24	9	54
	5/13/09	3,100	408	46.0			0.15	8	72
	6/19/09	1,530	410	11.0			0.24	4	51
	7/15/09	1,400	302	8.0			0.24	5	47
	8/19/09	2,330	276	9.0			0.24	8	48
	9/4/09	1,710	243	8.0			0.24	7	47
	10/14/09	2,090	243	7.0			0.24	9	45
	11/18/09	2,250	209	5.0			0.15	11	40
	12/16/09	2,240	181	4.0			0.24	12	37
	1/20/10	2,320	214	10.0			0.30	11	50
	2/24/10	2,540	263	6.0			0.30	10	43
	3/17/10	2,040	242	13.0			0.40	8	54
	4/28/10	1,890	344	22.0			0.46	5	61
	5/12/10	1,980	404	13.0			0.30	5	54
	6/16/10	2,450	357	198			0.24	7	93
	7/23/10	1,740	183	32.8			0.15	10	67
	8/18/10	1,710	220	8.4			0.30	8	47
	9/1/10	1,890	218	6.7			0.24	9	44
	10/20/10	1,740	173	7.0			0.30	10	45
	11/17/10	1,790	179	54.0			0.30	10	74
	12/22/10	1,970	220	16.0			0.30	9	57
	1/19/11	2,070	309	23.0			0.46	7	62
	3/16/11	2,270	480	126			0.46	5	86
	5/11/11	1,420	382	51.1			0.61	4	73
	7/20/11	2,300	235	158			0.30	10	90
	8/17/11	2,920	368	220			0.30	8	94
	9/21/11	2,900	371	156			0.30	8	89
	10/12/11	3,560	308	239			0.24	12	96
	11/16/11	2,650	201	116			0.15	13	85
	12/14/11	2,100	144	118			0.24	15	86
Minimum Value:		**1,100**	**74**	**3**			**0.15**	**3**	**33**
Maximum Value:		**4,870**	**624**	**360**			**0.85**	**24**	**102**
Geometric mean:		**1,966**	**219**	**43**			**0.39**	**9**	**68**

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-3	2/11/93	1,280	148	42.0			0.76	9	71
	3/11/93	1,770	176	116			0.46	10	85
	4/12/93	2,850	219	229			0.46	13	95
	5/11/93	2,100	279	56.0			0.61	8	75
	6/11/93	4,030	404	498			0.40	10	106
	7/9/93	1,840	356	87.0			0.70	5	81
	8/10/93	2,020	293	142.0			0.61	7	88
	9/11/93	1,720	199	74.0			0.70	9	79
	10/11/93	1,730	131	97.0			0.46	13	83
	11/13/93	1,770	98	97.0			0.70	18	83
	12/16/93	1,670	101	70.0			0.61	17	78
	1/12/94	1,640	115	79.0			0.61	14	80
	2/15/94	1,640	137	82.0			0.70	12	80
	3/17/94	1,520	113	70.0			0.55	13	78
	4/15/94	1,770	132	81.0			0.40	13	80
	5/13/94	2,060	146	111			0.49	14	85
	6/11/94	2,090	165	128			0.30	13	87
	7/13/94	2,220	120	136			0.40	19	88
	8/20/94	2,010	113	143			0.55	18	88
	9/14/94	1,850	111	114			0.46	17	85
	10/13/94	1,930	177	36.0			0.46	11	68
	11/23/94	1,400	190	9.0			0.46	7	48
	12/16/94	1,370	178	4.0			0.46	8	37
	1/13/95	1,290	134	52.0			0.55	10	74
	2/13/95	1,230	98	28.0			0.61	13	65
	3/18/95	1,240	115	72.0			0.61	11	78
	4/20/95	1,530	186	47.0			0.58	8	72
	5/13/95	1,480	213	53.0			0.70	7	74
	6/12/95	1,360	166	36.0			0.85	8	68
	7/8/95	1,650	150	99.0			0.55	11	83
	8/16/95	1,650	135	88.0			0.55	12	81
	9/16/95	1,410	141	53.0			0.46	10	74
	10/14/95	1,350	152	32.0			0.46	9	67
	11/16/95	1,470	109	26.0			0.40	13	64
	12/18/95	1,220	81	34.0			0.55	15	68
	1/16/96	1,310	130	40.0			0.46	10	70
	2/15/96	990	106	35.0			0.70	9	68
	3/20/96	1,360	151	46.0			0.55	9	72
	4/24/96	1,230	180	32.0			0.46	7	67
	5/18/96	1,630	235	77.0			0.46	7	79
	6/13/96	1,440	221	62.0			0.61	7	76
	7/12/96	1,340	194	45.0			0.61	7	72
	8/21/96	1,320	178				0.61	7	
	9/26/96	1,280	129	54.0			0.55	10	74
	10/16/96	1,280	136	49.0			0.55	9	73
	11/21/96	1,840	97	37.0			0.55	19	69
	12/16/96	1,280	96	40.0			0.46	13	70
	1/18/97	1,160	102	41.0			0.61	11	70
	2/25/97	1,290	100	53.0			0.55	13	74
	3/22/97	1,570	145	39.0			0.46	11	70
	4/19/97	1,620	151	69.0			0.55	11	78
	5/15/97	1,600	197	103			0.46	8	84
	6/16/97	1,670	220	105			0.40	8	84
	7/17/97	1,860	149	115			0.46	12	85
	8/15/97	1,600	116	77.0			0.49	14	79
	9/18/97	2,090	113	119			0.55	18	86
	10/20/97	1,490	88	69.0			0.61	17	78

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-3	11/17/97	1,360	72	57.0			0.61	19	75
	12/18/97	1,300	82	30.0			0.61	16	66
	1/22/98	1,530	188	27.0			0.46	8	64
	2/21/98	1,130	167	31.0			0.46	7	66
	3/23/98	1,430	227	8.0			0.46	6	47
	4/14/98	1,750	253	7.0			0.46	7	45
	5/23/98	1,690	275	16.0			0.46	6	57
	6/16/98	1,610	275	83.0			0.40	6	80
	7/17/98	1,490	247	40.0			0.46	6	70
	8/15/98	1,730	303	31.0			0.30	6	66
	10/24/98	1,680	204	17.0			0.46	8	58
	11/17/98	1,740	192	51.0			0.55	9	73
	12/22/98	1,770	195	15.0			0.76	9	56
	1/20/99	1,740	238	57.0			0.61	7	75
	2/17/99	1,580	254	43.0			0.70	6	71
	3/17/99	1,650	244	45.0			0.61	7	72
	4/19/99	1,510	320	56.0			0.46	5	75
	5/24/99	1,480	278	73.0			0.61	5	79
	6/19/99	1,630	364	93.0			0.46	4	82
	7/15/99	1,440	252	61.0			0.46	6	76
	8/14/99	1,850	241	97.0			0.46	8	83
	10/12/99	1,610	191	58.0			0.40	8	75
	11/18/99	1,660	160	14.0			0.46	10	55
	12/16/99	1,690	174	16.0			0.40	10	57
	1/20/00	1,560	163	12.0			0.46	10	53
	2/22/00	1,470	160	40.0			0.61	9	70
	3/22/00	1,770	141	27.0			0.55	13	64
	4/15/00	2,080	189	70.0			0.46	11	78
	5/23/00	1,870	362	83.0			0.40	5	80
	6/17/00	2,200	402	171			0.30	5	91
	7/14/00	2,370	432	156			0.30	5	90
	8/18/00	2,730	334	163			0.40	8	90
	9/12/00	2,730	301	209			0.30	9	94
	10/24/00	2,150	160				0.30	13	
	11/15/00	2,930	191	195			0.30	15	93
	12/16/00	2,580	189	148			0.30	14	89
	1/24/01	2,260	186	171			0.30	12	91
	3/21/01	1,980	266	118			0.30	7	85
	4/20/01	3,260	381	240			0.24	9	96
	5/23/01	2,020	422	128			0.30	5	87
	6/20/01	3,400	508	225			0.24	7	95
	7/16/01	3,460	409	238			0.24	8	96
	8/14/01	3,770	404	236			0.27	9	95
	9/18/01	2,970	263	183			0.27	11	92
	10/18/01	2,950	389	69.0			0.24	8	78
	11/13/01	2,170	280	32.0			0.24	8	67
	12/11/01	2,900	303	10.0			0.30	10	50
	1/15/02	3,060	319	5.0			0.24	10	40
	2/12/02	3,050	322	8.0			0.40	9	47
	3/13/02	2,540	346	21.0			0.46	7	61
	4/17/02	2,160	393	38.0			0.46	5	69
	5/15/02	2,180	613	83.0			0.30	4	80
	6/12/02	2,690	581	127			0.30	5	87
	7/16/02	2,330	395	45.0			0.30	6	72
	8/21/02	1,700	399	6.0			0.24	4	43
	9/18/02	1,800	362	3.0			0.18	5	33
	10/15/02	2,030	339	5.0			0.21	6	40

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-3	11/13/02	2,150	280	3.0			0.24	8	33
	12/18/02	1,960	218	3.0			0.27	9	33
	1/15/03	1,570	205	8.0			0.30	8	47
	2/12/03	1,920	298	12.0			0.46	6	53
	3/19/03	2,060	361	95.0			0.30	6	82
	4/16/03	1,790	266	30.0			0.30	7	66
	5/14/03		336	3.0			0.30		33
	6/17/03	1,900	303	12.0			0.46	6	53
	7/2/03	1,610	294	12.0			0.46	5	53
	8/13/03	1,600	253	7.0			0.30	6	45
	9/10/03	1,580	246	8.0			0.30	6	47
	10/15/03	1,690	235	3.0			0.30	7	33
	11/12/03	1,620	225	6.0			0.30	7	43
	12/19/03	1,820	243	3.0			0.46	7	33
	1/14/04	2,150	341	6.0			0.46	6	43
	2/18/04	1,880	407				0.55	5	
	3/10/04	2,070	417	52.0			0.55	5	74
	4/21/04	1,600	460	68.0			0.40	3	78
	5/12/04	2,090	547	44.0			0.61	4	71
	6/16/04	1,420	403	94.0			0.46	4	82
	7/14/04	2,730	457	191			0.30	6	92
	8/18/04	2,170	317				0.30	7	
	9/15/04	2,200	330	80.0			0.24	7	80
	10/13/04	2,540	332	26.0			0.30	8	64
	11/17/04	1,710	166	33.0			0.30	10	67
	12/15/04	2,450	183	13.0			0.46	13	54
	1/19/05	2,010	199	16.0			0.46	10	57
	2/16/05	2,180	191	32.0			0.46	11	67
	3/11/05	1,980	218	30.0			0.61	9	66
	4/20/05	1,610	74	77.0			0.30	22	79
	5/10/05	1,960	315	75.0			0.40	6	79
	6/15/05	1,680	346	63.0			0.46	5	76
	7/14/05	1,680	322	113			0.40	5	85
	8/16/05	1,650	249	155			0.46	7	89
	9/28/05	1,740	209	116			0.30	8	85
	10/12/05	2,910	175	12.0			0.46	17	53
	11/15/05	1,360	145	34.0			0.61	9	68
	12/14/05	1,540	146	10.0			0.61	11	50
	1/25/06	3,280	183	62.0			0.61	18	76
	2/22/06	1,450	212	75.0			0.55	7	79
	3/15/06	3,710	301	48.0			0.91	12	73
	4/19/06	1,580	297	94.0			0.46	5	82
	5/24/06	1,650	315	54.0			0.46	5	74
	6/21/06	1,870	372	76.0			0.40	5	79
	7/14/06	2,370	405	175			0.30	6	91
	8/16/06	1,790	350	84.0			0.46	5	81
	9/13/06	1,920	212	111			0.40	9	85
	10/19/06	2,190	154				0.30	14	
	11/15/06	2,020	136	107			0.30	15	84
	12/13/06	2,540	169	161			0.24	15	90
	1/17/07	1,910	163	90.0			0.30	12	82
	2/14/07	1,770	126	79.0			0.55	14	80
	3/21/07	2,250	155	125			0.46	15	86
	4/11/07	2,470	187	129			0.24	13	87
	5/16/07	2,410	167	109			0.30	14	84
	6/13/07	2,620	200	182			0.24	13	92
	8/22/07	2,980	171	187			0.15	17	92

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
LakeWatch Lake-Trout-3	9/12/07	3,000	191	161			0.15	16	90
	10/15/07	2,140	136	106			0.40	16	84
	11/12/07	1,960	112	75.8			0.30	18	79
	12/12/07	2,000	122	105			0.30	16	84
	1/14/08	1,880	140	103			0.30	13	84
	2/11/08	3,230	153	132			0.30	21	87
	3/12/08	1,960	148	122			0.30	13	86
	4/16/08	2,520	173	148			0.30	15	89
	5/14/08	3,100	195	177			0.15	16	91
	6/18/08	3,020	197	195			0.24	15	93
	7/9/08	2,900	191	210			0.24	15	94
	8/13/08	2,870	182	177			0.30	16	91
	9/3/08	2,840	389	62.0			0.24	7	76
	10/15/08	4,250	432	3.0			0.15	10	33
	11/19/08	4,430	336	2.0			0.15	13	27
	12/17/08	4,240	319	4.0			0.15	13	37
	1/19/09	4,910	404	5.0			0.40	12	40
	2/18/09	2,190	278	9.0			0.15	8	48
	3/18/09	3,500	401	22.0			0.15	9	61
	4/15/09	3,500	413	12.6			0.24	8	53
	5/13/09	3,000	420	17.0			0.15	7	58
	6/19/09	1,550	437	15.0			0.24	4	56
	7/15/09	1,400	309	8.0			0.24	5	47
	8/19/09	2,450	266	8.0			0.15	9	47
	9/4/09	2,270	282	3.0			0.24	8	33
	10/14/09	2,110	249	7.0			0.24	8	45
	11/18/09	2,250	199	6.0			0.15	11	43
	12/16/09	2,250	182	4.0			0.24	12	37
	1/20/10	2,410	214	7.0			0.24	11	45
	2/24/10	2,490	266	9.0			0.30	9	48
	3/17/10	1,820	251	13.0			0.40	7	54
	4/28/10	1,890	355	17.0			0.46	5	58
	5/12/10	1,910	407	8.0			0.30	5	47
	6/16/10	2,450	350	158			0.24	7	90
	7/23/10	1,690	183	37.8			0.15	9	69
	8/18/10	1,640	222	8.1			0.24	7	47
	9/1/10	1,830	213	5.8			0.24	9	42
	10/20/10	2,360	238	7.0			0.24	10	45
	11/17/10	1,780	176	37.0			0.30	10	69
	12/22/10	1,960	229	15.0			0.30	9	56
	1/19/11	2,060	323	31.0			0.46	6	66
	3/16/11	2,240	490	113			0.46	5	85
	5/11/11	1,410	387	46.3			0.61	4	72
	7/20/11	2,300	235	184			0.30	10	92
	8/17/11	2,820	361	139			0.30	8	88
	9/21/11	2,620	356	136			0.30	7	88
	10/12/11	3,600	312	260			0.24	12	97
	11/16/11	2,590	198	118			0.15	13	85
	12/14/11	2,200	155	127			0.24	14	87
Minimum Value:		**990**	**72**	**2**			**0.15**	**3**	**27**
Maximum Value:		**4,910**	**613**	**498**			**0.91**	**22**	**106**
Geometric mean:		**1,962**	**220**	**42**			**0.38**	**9**	**68**

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Trout Lake Site 1 - Annual Geometric Mean Values	1993	1,855	190	95.2			0.62	10	82
	1994	1,727	134	52.9			0.50	13	72
	1995	1,350	133	48.0			0.59	10	72
	1996	1,354	146	42.0			0.55	9	70
	1997	1,546	123	63.4			0.54	13	76
	1998	1,631	224	23.8			0.48	7	61
	1999	1,605	231	45.0			0.51	7	71
	2000	2,188	234	86.8			0.38	9	80
	2001	2,735	331	108	128		0.28	8	83
	2002	2,193	359	10.9	397		0.30	6	47
	2003	1,848	265	9.6	323		0.34	7	48
	2004	2,065	345	44.4	171		0.43	6	70
	2005	1,814	197	39.4	190		0.45	9	69
	2006	2,251	254	103	122		0.43	9	83
	2007	2,264	153	115	56	172	0.30	15	85
	2008	2,992	218	51.3	148	172	0.22	14	67
	2009	2,399	299	8.1	384	134	0.21	8	46
	2010	2,057	247	13.3	260	117	0.31	8	52
	2011	2,298	282	101	77	197	0.32	8	83
Trout Lake Site 2 - Annual Geometric Mean Values	1993	1,869	189	101			0.61	10	83
	1994	1,767	136	53			0.49	13	71
	1995	1,399	135	49			0.58	10	72
	1996	1,340	146	41			0.57	9	70
	1997	1,553	123	65			0.54	13	77
	1998	1,598	224	25			0.49	7	62
	1999	1,603	236	43			0.50	7	71
	2000	2,145	236	92			0.40	9	81
	2001	2,765	330	109			0.27	8	83
	2002	2,345	363	12			0.30	6	49
	2003	1,849	266	9			0.35	7	47
	2004	1,993	349	43			0.42	6	69
	2005	1,769	196	40			0.46	9	69
	2006	2,197	248	96			0.42	9	82
	2007	2,260	154	117			0.30	15	85
	2008	3,003	217	53			0.22	14	68
	2009	2,509	314	9			0.21	8	48
	2010	1,988	242	17			0.29	8	56
	2011	2,393	294	111			0.32	8	84

Historical Water Quality Data Collected in Trout Lake by LakeWatch from 1993 - 2011

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Color (Pt-Co)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Trout Lake Site 3 - Annual Geometric Mean Values	1993	1,975	197	106			0.57	10	83
	1994	1,771	139	58			0.47	13	73
	1995	1,399	135	47			0.56	10	72
	1996	1,344	148	46			0.54	9	72
	1997	1,532	121	67			0.52	13	77
	1998	1,584	226	23			0.46	7	61
	1999	1,618	240	48			0.50	7	72
	2000	2,154	233	86			0.38	9	80
	2001	2,764	334	111			0.27	8	83
	2002	2,266	366	12			0.29	6	50
	2003	1,735	269	9			0.35		47
	2004	2,050	345	41			0.40	6	69
	2005	1,824	200	44			0.45	9	70
	2006	2,112	243	88			0.42	9	81
	2007	2,286	155	117			0.29	15	85
	2008	2,999	220	53			0.23	14	68
	2009	2,467	307	8			0.21	8	46
	2010	1,997	250	15			0.28	8	54
	2011	2,360	297	109			0.32	8	84

B.2 SJRWMD Data

Historical Water Quality Characteristics in Trout Lake from 2000 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station ID	Date	Water Depth (m)	Temp. (°C)	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	TSS (mg/L)	Turbidity (NTU)	Color (Pt-Co)	Chloride (mg/L)	TOC (mg/L)	Sulfate (mg/L)	Chyl-a (mg/m^3)	Secchi (m)	Diss. Al (µg/L)	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD 44576	1/27/00	2.97	12.50	7.10	9.2	160	24.8	54	419	1,587	2,060	101	41	142	8.0	2.5	400	21.7	29.3	10.7	6.4	0.51			15	44
	5/30/00	2.71	28.98	7.59	6.7	239	43.9	9	2	2,386	2,397	236	64	300	19.0	15.1	80	26.5	23.7	10.9	63.3	0.43			8	77
	1/21/04	3.05	14.37	6.73	5.6	133	24.6	116	763	1,374	2,253	295	52	346	1.5	2.0	250	19.3	28.3	7.0	5.4	0.55		104	7	41
	4/21/04	2.90	22.26	7.26	6.0	134	38.2	24	16	1,734	1,775	324	82	406	5.5	9.1	200	21.5	23.8	11.0	58.8	0.50		58	4	75
	7/22/04	2.70	28.48	7.31	3.3	149	45.8	16	2	2,589	2,607	172	94	267	21.0	24.1	70	22.8	21.1	6.0	95.7	0.45		103	10	82
	10/20/04	3.10	23.59	5.66	0.8	65	21.8	460	28	1,620	2,108	153	68	222	4.7	2.3	500	13.5	36.8	3.1	32.4	0.40	153	165	9	67
	1/19/05	3.00	13.70	6.71	5.6	129	15.4	75	655	1,759	2,488	97	109	207	3.5	2.8	300	17.7	25.7	6.9	9.9	0.50	88	119	12	50
	4/20/05	2.85	21.47	6.75	5.3	146	21.1	30	9	1,867	1,906	114	82	196	7.0	5.5	300	21.9	28.8	7.4	52.7	0.55	71	83	10	74
	7/27/05	2.80	29.72	6.05	1.1	94	17.3	14	4	1,470	1,488	201	49	251	4.0	5.5	400	11.2	31.0	3.9	35.2	0.50	120	155	6	68
	10/26/05	3.05	18.99	6.21	4.7	96	12.2	94	156	1,207	1,458	105	26	131	5.5	1.9	300	13.1	23.0	3.5	16.7	0.65	85	103	11	57
	1/26/06	3.05	17.29	6.43	5.8	117	13.5	105	162	1,318	1,584	130	24	154	6.0	3.4	150	16.8	22.1	5.2	25.8	0.70	58	81	10	64
	4/19/06	2.90	24.24	6.34	1.6	125	15.9	12	7	1,666	1,685	193	38	231	6.5	6.7	150	18.6	21.1	6.5	72.3	0.60	49	73	7	78
	7/27/06	2.70	30.72	6.18	0.7	140	16.6	16	5	2,091	2,113	268	28	296	16.0	16.0	80	21.6	21.0	5.9	60.4	0.60	27	47	7	76
	10/19/06	2.55	24.31	6.82	3.3	154	23.2	10	2	2,206	2,219	18	24	42	22.5	21.5	60	22.1	19.0	6.5	85.6	0.40	51	70	53	81
	11/29/06	2.40	19.19	7.48	6.5	153	22.1	5	2	2,603	2,610	2	14	16	25.0	25.5	50	23.1	18.7	7.6	116.6	0.35	15	78	162	85
	12/20/06	2.40	19.59	8.88	9.3	155	20.4	4	2	2,603	2,609	8	17	25	36.0	34.8	60	23.6	19.0	9.0	108.5	0.35	18	90	106	84
	1/25/07	2.40	17.38	7.32	7.0	162	25.3	14	3	2,151	2,168	21	21	42	29.0	20.6	60	23.6	17.5	10.0	67.0	0.45	17	108	52	77
	2/21/07	2.50	14.05	7.49	7.4	163	25.4	9	2	2,050	2,061	3	17	20	18.0	12.1	60	22.2	17.4	11.1	59.9	0.50	38	76	102	76
	3/22/07	2.45	20.03	7.80	8.0	171	24.9	11	2	1,617	1,630	2	12	14	26.9	14.4	50	24.3	15.9	12.9	92.9	0.50	19	129	116	82
	4/19/07	2.30	20.98	7.67	6.6	175	24.4	11	2	2,817	2,830	1	22	23	33.9	18.7	60	24.1	21.7	13.0	105.5	0.30	16	151	122	84
	5/23/07	2.10	25.01	7.96	6.0	187	24.7	33	2	2,715	2,750	3	25	28	26.7	15.4	60	27.1	21.3	13.9	79.3	0.40	15	178	99	80
	6/27/07	2.00	29.09	7.63	4.4	184	23.6	35	2	3,238	3,275	3	25	28	36.7	18.7	60	29.5	20.1	12.2	160.8	0.30	15	126	117	90
	7/26/07	2.20	29.32	7.30	2.4	177	23.0	18	2	2,976	2,996	1	21	22	29.0	19.3	70	26.7	19.1	10.4	149.0	0.30	99	86	138	89
	8/22/07	2.20	30.96	8.10	7.0	178	21.8	23	4	3,137	3,164	1	23	24	22.7	25.1	50	28.3	20.0	9.5	147.5	0.35	12	99	129	89
	9/26/07	2.30	28.20	7.57	5.4	169	25.7	4	6	2,397	2,407	1	17	18	21.6	13.8	50	25.5	18.8	8.7	90.8	0.40	13	82	134	82
	10/17/07	2.50	26.32	7.14	4.1	172	25.4	5	8	2,052	2,065	3	17	20	15.2	9.8	50	24.2	19.8	12.5	65.9	0.55	10	58	106	77
	11/20/07	2.40	19.94	8.28	9.6	176	23.0	22	2	1,767	1,791	1	24	25	14.5	7.3	50	25.8	17.9	13.6	46.5	0.65	0	55	73	72
	12/19/07	2.40	17.13	7.88	7.6	172	22.1	12	4	2,058	2,074	2	50	53	20.9	11.7	50	23.9	17.8	12.9	84.4	0.50	6	78	39	81
	1/23/08	2.40	16.25	8.14	7.9	174	22.2	12	9	2,011	2,031	1	20	21	18.0	10.3	50	24.2	17.7	14.8	76.2	0.60	7	68	97	79
	2/26/08	2.45	22.12	8.68	9.6	179	23.1	15	2	2,312	2,329	1	25	26	25.4	13.3	50	24.3	16.6	16.7	97.7	0.40	22	129	89	83
	3/18/08	2.35	21.01	7.94	8.4	184	23.3	2	5	2,457	2,465	1	27	28	29.4	17.7	50	25.9	16.7	16.9	93.6	0.40	21	213	87	82
	4/23/08	2.30	24.70	8.97	9.1	188	24.5	18	2	2,714	2,733	1	23	24	37.1	18.7	50	26.3	18.9	20.2	114.5	0.35	11	226	112	85
	5/22/08	2.10	26.70	8.32	6.5	211	31.2	17	2	2,975	2,994	1	23	24	27.1	18.4	60	29.3	19.0	20.8	124.1	0.35	22	178	124	86
	6/25/08	2.25	29.00	8.44	4.6	205	28.8	24	2	2,769	2,795	1	17	18	28.6	17.5	50	27.9	24.2	18.0	138.8	0.30	15	91	160	88
	7/15/08	2.30	29.62	8.89	5.4	200	30.8	7	2	2,967	2,976	1	19	20	26.7	19.4	50	28.4	18.1	16.0	137.5	0.35	21	79	149	88
	8/27/08	3.10	25.82	5.57	0.3	118	20.1	17	5	2,416	2,438	55	42	97	16.7	14.0	400	14.7	34.8	20.7	80.2	0.45	250	427	25	80
	9/17/08	2.60	28.24	6.00	4.7	177	20.5	1,182	31	3,086	4,298	172	211	384	5.3	3.6	1,000	15.5	71.9	26.5	28.0	0.25		537	11	65
	10/30/08	2.55	18.76	5.99	3.3	171	13.8	773	356	3,132	4,261	293	80	373	12.5	1.6	1,000	15.8	72.9	21.8	0.9	0.15		581	11	15
	11/19/08	2.45	16.53	6.15	6.2	174	14.7	786	512	3,123	4,421	272	68	340	0.7	1.8	1,000	17.4	63.7	22.6	1.2	0.20		538	13	20
	12/16/08	2.50	18.44	5.81	6.3	173	9.0	349	998	3,160	4,507	272	46	318	2.5	2.0	1,000	16.9	58.7	22.5	0.9	0.30		475	14	16
	1/27/09	2.40	15.62	6.19	6.3	184	21.1	584	1,068	3,080	4,732	339	67	406	2.5	18.1	800	19.7	54.7	25.6	2.1	0.30		425	12	28
	2/23/09	2.45	16.99	6.11	5.9	190	12.4	321	1,624	3,084	5,029	363	46	409	4.0	6.5	800	18.8	48.5	25.9	4.4	0.40		380	12	38
	3/18/09	2.40	22.77	6.17	5.3	201	14.3	129	1,682	3,247	5,058	352	65	417	3.5	4.4	600	20.2	50.7	27.9	12.0	0.40		385	12	53
	4/23/09	2.35	22.67	6.30	4.9	122	15.1	48	1,342	2,965	4,356	319	56	375	4.0	4.3	400	20.5	47.2	29.6	6.3	0.40		312	12	43
	5/27/09	3.00	23.00	5.72	1.5	141	11.2	216	289	1,876	2,381	253	45	298	2.0	3.1	800	13.8	46.7	23.6	3.8	0.60		367	8	36
	6/17/09	2.90	27.86	5.65	0.1	117	11.6	498	74	2,286	2,858	320	68	388	2.5	2.6	800	12.4	62.0	13.9	3.3	0.25		468	7	34
	7/29/09	2.90	28.13	5.39	0.1	105	9.7	260	207			216	54	270	3.0	1.7	600	13.7	51.4	8.0	37.3	0.40		333		69
	8/20/09	3.00	28.37	5.88	0.3	100	11.1	293	87	2,083	2,463	219	39	258	7.0	1.4	600	14.0	46.0	6.6	3.2	0.45		272	10	34
	9/17/09	3.05	27.71	5.96	0.3	96	8.9	103	250	1,849	2,202	201	47	247		1.4	600	13.2	39.0	5.2	14.1	0.45		222	9	55
	10/14/09	2.90	26.76	6.10	0.5	104	11.1	102	249			191	37	228	1.5	1.1	500	14.0	38.5	4.1	1.5	0.30		189		23
	12/8/09	2.90	17.19	6.53	6.1	118	13.6	102	393	1,806	2,301	125	37	162	1.2	1.4	500	15.6	36.9	5.8	1.5	0.35		192	14	23
	2/17/10	2.90	12.14	6.85	8.3	138	20.4	68	634	1,701	2,403	212	33	245	2.5	1.9	400	17.8	33.5	8.0	2.2	0.55		172	10	28
	4/8/10	2.90	19.07	6.26	1.0	114	14.8	176	173	1,499	1,848	207	35	241	2.5	1.8	400	15.0	31.9	6.8	16.6	0.30		203	8	57
	6/9/10	2.90	27.54	6.51	1.2	123	17.4	34	10	1,676	1,720	272	33	305	6.0	3.6	400	17.1	27.5	5.5	45.5	0.40		116	6	72
	8/12/10	2.90	28.76	6.27	0.5	91	12.9	382	18	1,649	2,049	193	29	222	1.0	1.5	400	12.3	29.8	3.9	5.5	0.35		150	9	41
	10/6/10	2.80	24.93	6.97	5.5	105	13.5	100	348	1,630	2,077	157	25	181	4.0	1.1	316	15.1	30.8	5.0	3.4	0.35		127	11	34
	12/15/10	2.80	9.05	7.62	8.2	138	21.5	161	336	1,450	1,947	164	19	183	2.5	1.7	254	17.1	23.0	7.5	6.4	0.50		99	11	43

Historical Water Quality Characteristics in Trout Lake from 2000 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station ID	Date	Water Depth (m)	Temp. (°C)	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	TSS (mg/L)	Turbidity (NTU)	Color (Pt-Co)	Chloride (mg/L)	TOC (mg/L)	Sulfate (mg/L)	Chyl-a (mg/m^3)	Secchi (m)	Diss. Al (µg/L)	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD 44576	2/9/11	2.80	16.17	8.35	10.7	155	29.0	17	63	2,071	2,150	242	33	274	12.0	16.1	204	19.2	24.0	10.1	104.3	0.35		93	8	84
	3/30/11	2.70	22.82	7.08	1.2	182	39.6	507	55	1,776	2,338	358	64	422	3.5	3.3	134	38.4	20.9	4.4	5.7	0.70		55	6	42
	6/9/11	2.70	28.50	6.85	1.8	189	46.0	12	3	1,495	1,509	139	43	182	7.0	5.7	78	20.8	21.8	8.5	41.7	0.60		36	8	71
	9/1/11	2.50	29.14	7.31	7.3	205	54.8	32	2	3,379	3,413	127	16	143	36.0	62.5	54	24.0	17.9	6.2	107.2	0.38			24	84
	10/11/11	2.64	25.77	9.92	14.6	195	50.3	25	3	3,397	3,425	71	22	93	36.0	55.2	97	22.6	22.5	7.8	193.0	0.35		255	37	93
	12/5/11	2.50	18.97	8.08	9.4	234	62.9	46	5	2,323	2,374	4	10	14	37.7	17.8	56	24.3	22.2	9.3	89.6	0.45		168	165	82
	2/9/12	2.46	19.44	8.17	8.2	254	67.5	50	4	2,610	2,664	54	19	73	30.7	35.5	46	24.8	14.1	10.7	95.2	0.45		178	37	82
	4/11/12	2.53	24.82	9.22	10.2	270	80.9	34	16	3,668	3,718	13	16	29	31.3	27.7	45	28.4	18.5	13.1	199.8	0.35		184	129	93
	6/13/12	2.41	29.85	9.33	9.2	263	85.1	43	3	2,215	2,260	19	16	35	17.2	16.8	39	19.7	21.0	20.0	59.8	0.53		90	65	76
	8/14/12	2.42	31.40	9.14	11.3	261	76.5	28	2	2,326	2,357	1	20	21	21.2	16.1	44	25.9	15.7	11.3	74.9	0.43		70	113	79
	10/16/12	2.68	26.08	7.90	6.8	261	79.6	55	2	2,273	2,330	2	12	14	18.2	11.3	49	26.2	20.4	9.1	86.8	0.54		49	169	81
	12/10/12	2.43	20.33	8.54	10.4	271	81.0	42	2	1,949	1,993	1	6	7	15.6	9.0	36	27.0	18.2	9.1	64.3	0.65		38	293	77
	2/12/13	2.42	21.17	7.82	10.0	291	82.4	29	2	1,506	1,537	35	10	45	12.0	7.0	32	29.0	16.0	13.0	32.2	0.66		42	34	67
	4/16/13	2.24	25.52	8.47	10.2	310	88.8	81	7	1,638	1,726	113	18	131	12.0	7.8	33	31.2	17.2	15.5	49.4	0.77		64	13	73
	6/11/13	2.22	29.50	9.40	12.4	279	79.1	58	15	1,893	1,966	175	20	195	17.2	11.5	37	32.0	15.9	8.2	55.7	0.56		99	10	75
	8/13/13	2.61	30.98	9.11	8.1	258	76.1	46	5	2,445	2,496	200	16	216	22.2	12.5	92	28.3	22.8	9.0	78.9	0.43		97	12	80
	10/15/13	2.52	26.01	8.44	6.9	268	86.8	18	4	2,823	2,844	52	25	77	22.0	15.7	89	29.1	21.5	7.1	107.1	0.37		89	37	84
	12/11/13	2.52	22.00	8.20	7.6	297	92.7	21	9	2,797	2,827	72	20	92	24.2	15.2	57	29.8	23.1	8.1	91.4	0.40		106	31	82
	2/11/14	2.53	16.79	8.59	11.9	280	85.2	2	8	2,475	2,485	58	15	74	21.8	14.8	57	28.6	22.2	7.6	76.1	0.40		75	34	79
	4/10/14	2.54	22.94	7.99	8.1	246	67.0	4	11	3,919	3,934	64	22	86	28.4	23.5	127	25.6	26.2	9.4	170.7	0.35		108	46	91
	6/10/14	2.68	29.38	8.24	6.2	232	63.8	11	8	2,932	2,951	63	18	80	21.6	18.2	119	26.3	26.8	8.6	83.4	0.50		54	37	81
	8/12/14	2.70	30.09	6.93	4.4	177	52.4	461	45	2,000	2,507	132	27	159	6.0	4.3	253	21.1	35.2	5.4	40.8	0.64		76	16	70
	10/14/14	2.64	26.36	6.80	3.3	110	34.0	269	122	1,700	2,090	176	37	213	1.4	2.4	439	13.0	43.4	4.2	25.6	0.58		249	10	63
	12/16/14	3.20	14.94	6.17	4.9	111	16.5	426	266	1,694	2,386	175	28	203	0.2	1.1	424	14.0	38.0	4.5	3.7	0.95		217	12	36
	2/18/15	3.20	16.47	6.56	7.6	118	16.6	177	452	1,942	2,571	179	39	218	1.8	1.9	372	16.4	35.4	5.6	7.6	0.45		182	12	46
	4/16/15	2.87	26.59	5.57	5.6	143	24.3	10	478	1,888	2,375	244	50	294	3.2	2.9	340	18.6	33.4	5.8	32.7	0.50		128	8	67
	6/16/15	2.87	30.10	7.27	7.1	204	53.2	13	21	1,674	1,707	232	29	261	4.0	6.2	222	23.5	26.8	6.9	23.5	0.80		46	7	62
SJRWMD 44576	Annual Geometric Mean Values	2000	7.34	7.9	196	33.0	22	29	1,946	2,222	154	51	-	12.3	6.2	179	24.0	26.3	10.8	20.2	0.47			11	58
		2004	6.71	3.1	114	31.1	68	29	1,778	2,165	224	72	-	5.3	5.7	205	18.9	26.9	6.1	31.5	0.47	153	100	7	64
		2005	6.42	3.5	114	16.2	41	44	1,554	1,791	124	58	-	4.8	3.6	322	15.4	26.9	5.1	23.5	0.55	89	112	9	62
		2006	6.96	3.3	140	18.3	13	6	2,023	2,098	36	23	-	15.3	13.8	83	20.8	20.1	6.7	70.4	0.48	32	72	28	78
		2007	7.67	5.9	174	24.1	14	3	2,358	2,377	2	22	-	23.6	14.8	55	25.3	18.9	11.6	89.4	0.42		96	96	81
		2008	7.29	4.8	178	20.7	46	13	2,734	3,072	9	36	-	12.8	8.1	164	21.5	30.0	19.5	29.4	0.32	22	227	48	55
		2009	5.99	1.2	130	12.4	188	395	2,409	3,285	251	50	-	2.8	2.8	621	15.7	46.9	12.5	4.9	0.38		309	10	37
		2010	6.73	2.4	117	16.4	116	116	1,598	1,996	197	28	-	2.7	1.8	356	15.6	29.2	6.0	7.6	0.40		140	9	44
		2011	7.87	5.4	192	45.7	39	8	2,296	2,439	88	26	-	15.6	16.3	92	24.2	21.5	7.4	59.8	0.45		95	19	73
		2012	8.70	9.2	263	78.2	41	3	2,454	2,501	5	14	-	21.5	17.3	43	25.1	17.8	11.7	88.4	0.48		85	110	81
		2013	8.56	9.0	283	84.1	37	6	2,117	2,171	89	18	-	17.6	11.1	51	29.9	19.2	9.8	64.0	0.51		79	20	76
		2014	7.40	5.9	180	47.0	41	31	2,339	2,668	99	24	-	5.3	6.5	186	20.5	31.1	6.3	40.1	0.54		110	22	67
		2015	6.43	6.7	151	27.8	28	165	1,831	2,185	216	38	-	2.8	3.3	304	19.3	31.6	6.0	18.0	0.56		102	9	58
Mean Value:			7.24	5.3	172	35.0	53	65	2,111	2,382	115	35		11.0	8.6	205	21.3	26.6	9.2	42.1	0.46	74	127	31	64

APPENDIX C

HISTORICAL WATER QUALITY DATA FOR LAKE YALE

C.1 LakeWatch Data
C.2 Lake County Data
C.3 SJRWMD Data

C.1 LakeWatch Data

Historical Water Quality Data Collected in Lake Yale by LakeWatch from 1990 - 2016

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Yale	5/10/90	770	10	6		1.62	77	43
	6/19/90	720	9	6		1.83	80	43
	8/21/90	840	9	12		1.31	93	53
	12/6/91	530	11	4		2.74	48	37
	1/9/92	820	7	2		2.74	117	27
	5/26/94	850	8	4		1.83	106	37
	6/24/94	840	10	6		2.44	84	43
	6/19/98	910	21	8		1.46	43	47
	7/21/98	770	19	12		1.52	41	53
	8/19/98	760	21	6		1.83	36	43
	9/21/98	950	22	9		1.37	43	48
	10/21/98	1,030	26	23		1.07	40	62
	11/21/98	1,390	22	39		0.61	63	70
	12/19/98	1,610	23	54		0.55	70	74
	1/21/99	1,460	21	34		0.55	70	68
	2/24/99	1,500	20	29		0.61	75	65
	3/24/99	1,400	19	15		0.70	74	56
	4/26/99	1,660	27	28		0.46	61	65
	5/25/99	1,950	30	49		0.55	65	73
	6/22/99	1,470	21	39		0.61	70	70
	7/24/99	1,560	20	42		0.61	78	71
	8/26/99	1,690	23	43		0.55	73	71
	9/24/99	1,610	22	55		0.55	73	75
	10/23/99	1,510	29	58		0.55	52	75
	11/29/99	1,890	32	56		0.46	59	75
	12/19/99	1,830	30	53		0.46	61	74
	1/24/00	1,940	30	44		0.55	65	71
	2/28/00	1,900	24	27		0.70	79	64
	3/28/00	1,790	28	51		0.46	64	73
	4/29/00	1,990	30	65		0.40	66	77
	5/24/00	1,880	27	49		0.46	70	73
	6/24/00	1,820	21	51		0.46	87	73
	7/20/00	1,780	22	43		0.55	81	71
	8/21/00	1,590	19	34		0.61	84	68
	9/25/00	1,500	17	32		0.55	88	67
	10/25/00	1,210	17	27		0.70	71	64
	11/24/00	1,390	21	24		0.70	66	63
	12/11/00	1,340	21	20		0.61	64	60
	1/24/01	1,600	29	11		0.85	55	51
	2/22/01	1,620	22	6		1.22	74	43
	3/28/01	1,680	32	19		0.70	53	59
	4/26/01	1,550	23	21		0.70	67	61
	5/24/01	1,010	23	10		1.16	44	50
	6/27/01	1,280	27	11		0.91	47	51
	7/29/01	1,340	28	18		0.61	48	58
	8/25/01	1,660	26	43		0.55	64	71
	9/27/01	1,880	45	56		0.46	42	75
	10/31/01	2,200	39	118		0.40	56	85
	11/19/01	2,240	38	59		0.40	59	76
	12/18/01	2,150	30	80		0.46	72	80

Historical Water Quality Data Collected in Lake Yale by LakeWatch from 1990 - 2016

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Yale	1/24/02	2,140	29	47		0.46	74	72
	2/25/02	2,210	23	54		0.46	96	74
	3/25/02	1,820	31	48		0.55	59	73
	4/25/02	2,110	31	50		0.55	68	73
	5/21/02	1,840	35	47		0.55	53	72
	6/25/02	1,850	31	48		0.55	60	73
	7/24/02	1,800	26	50		0.46	69	73
	8/24/02	1,350	27	59		0.55	50	76
	9/20/02	1,340	25	49		0.46	54	73
	10/19/02	1,790	22	57		0.46	81	75
	11/20/02	1,860	26	54		0.55	72	74
	12/16/02	1,730	28	38		0.61	62	69
	1/27/03	1,880	33	12		1.01	57	53
	2/19/03	1,850	25	11		1.46	74	51
	3/25/03	1,810	26	29		0.85	70	65
	4/28/03	1,320	22	26		0.85	60	64
	5/20/03	1,360	19	19		1.01	72	59
	6/24/03	1,270	23	20		1.01	55	60
	7/24/03	1,350	23	17		0.85	59	58
	8/28/03	1,330	23	43		0.61	58	71
	9/29/03	1,620	23	37		0.61	70	69
	10/25/03	1,540	21	39		0.55	73	70
	11/24/03	1,560	24	47		0.55	65	72
	12/12/03	1,640	23	36		0.61	71	68
	1/27/04	1,970	18	16		0.91	109	57
	2/28/04	2,010	16	12		1.07	126	53
	3/31/04	1,760	16	10		1.46	110	50
	4/26/04	1,610	18	19		1.16	89	59
	5/21/04	1,410	23	28		0.76	61	65
	6/21/04	1,400	22	14		0.91	64	55
	7/30/04	1,350	22	22		0.76	61	61
	8/28/04	1,480	21	27		0.70	70	64
	10/29/04	1,720	32	56		0.61	54	75
	12/29/04	1,890	16	67		0.55	118	77
	1/26/05	1,790	22	54		0.40	81	74
	2/11/05	1,770	21	47		0.55	84	72
	5/30/05	1,730	18	18		0.70	96	58
	6/26/05	1,480	19	23		0.55	78	62
	8/28/05	1,220	18	10		0.70	68	50
	10/19/05	1,540	19	8		1.07	81	47
	11/26/05	1,220	26	30		0.76	47	66
	1/28/06	1,210	26	3		1.01	47	33
	3/17/06	990	16	6		1.07	62	43
	4/28/06	930	18	2		1.22	52	27
	5/26/06	970	21	10		1.07	46	50
	7/2/06	1,440	21	2		1.22	69	27
	8/19/06	1,580	34	23		0.76	46	62
	9/30/06	1,390	24	24		0.46	58	63
	11/17/06	1,850	28	53		0.55	66	74
	12/17/06	1,790	24	46		0.46	75	72

Historical Water Quality Data Collected in Lake Yale by LakeWatch from 1990 - 2016

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Yale	1/16/07	1,790	22	49	293	0.55	81	73
	2/17/07	1,880	29	55		0.46	65	75
	3/20/07	2,070	30	70		0.40	69	78
	4/13/07	2,260	31	80		0.40	73	80
	5/17/07	2,540	33	100		0.40	77	83
	6/15/07	2,070	26	36		0.70	80	68
	7/10/07	2,040	25	45	322	0.55	82	72
	8/5/07	1,940	22	38		0.61	88	69
	9/2/07	1,820	21	36		0.70	87	68
	10/22/07	1,770	23	32	321	0.76	77	67
	11/15/07	1,630	23	23		0.91	71	62
	12/12/07	1,580	24	18		0.91	66	58
	1/9/08	1,620	31	19	362	0.85	52	59
	2/5/08	1,050	29	17		0.91	36	58
	3/27/08	1,830	41	16		0.91	45	57
	4/22/08	1,780	38	13	310	0.91	47	54
	5/20/08	1,850	41	16		0.91	45	57
	6/10/08	1,690	30	29		0.76	56	65
	7/10/08	1,990	24	39		0.76	83	70
	8/10/08	1,950	26	51		0.76	75	73
	9/14/08	2,110	34	74		0.61	62	79
	10/12/08	2,140	36	80	317	0.55	59	80
	11/8/08	2,080	30	73		0.55	69	79
	12/16/08	2,420	27	65		0.55	90	77
	1/8/09	2,610	35	77	357	0.55	75	79
	2/13/09	2,580	27	66		0.55	96	77
	3/9/09	2,750	15	68		0.55	183	78
	4/9/09	2,850	32	91	366	0.46	89	82
	5/8/09	2,830	28	77		0.55	101	79
	6/16/09	2,190	24	44		0.70	91	71
	7/11/09	2,020	18	42	307	0.85	112	71
	8/6/09	1,820	19	31		0.85	96	66
	9/18/09	1,300	22	26		0.91	59	64
	10/28/09	1,600	19	22	323	0.91	84	61
	11/29/09	1,510	19	23		1.01	79	62
	12/13/09	1,640	20	22		1.01	82	61
	1/24/10	1,610	17	14	323	1.52	95	55
	2/20/10	1,820	16	9		1.62	114	48
	3/23/10	1,590	21	14		1.62	76	55
	4/17/10	1,640	19	17	312	1.46	86	58
	5/12/10	1,370	17	26		1.22	81	64
	6/14/10	1,250	16	9		1.52	78	49
	7/13/10	1,250	17	17	310	1.46	74	57
	8/12/10	1,170	17	22		1.16	69	62
	9/10/10	1,420	15	21		1.07	95	61
	10/9/10	1,580	19	26	302	1.01	83	64
	11/11/10	1,590	21	32	342	0.91	76	67
	12/20/10	1,880	24	29	348	0.85	78	65

Historical Water Quality Data Collected in Lake Yale by LakeWatch from 1990 - 2016

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Yale	1/16/11	1,780	20	26	357	0.85	89	64
	3/13/11	1,860	22	30	354	0.91	85	66
	5/20/11	2,230	28	46	351	0.70	80	72
	7/11/11	2,430	14	55	363	0.70	174	74
	8/23/11	1,920	18	47	359	0.70	107	72
	9/19/11	2,110	27	31	399	0.91	78	66
	10/13/11	2,160	21	23	371	1.07	103	62
	11/15/11	2,220	23	22	374	1.01	97	61
	12/14/11	2,300	29	24	394	1.22	79	63
	1/16/12	2,190	34	27	418	1.16	64	64
	2/22/12	2,340	36	2	395	1.31	65	27
	3/12/12	2,530	42	15	406	1.31	60	56
	4/12/12	2,620	27	17	405	1.22	97	57
	5/21/12	1,840	30	20	380	0.91	61	60
	6/12/12	1,710	31	17	374	1.07	55	58
	7/9/12	1,440	28	13	345	1.16	51	54
	8/6/12	1,590	26	24	359	1.07	61	63
	9/12/12	1,910	28	50	363	0.76	68	73
	10/7/12	2,070	24	55	371	0.70	86	75
	11/12/12	1,710	26	37	387	0.85	66	69
	1/29/13	1,510	22	28		1.01	69	65
	2/11/13	1,640	31	28		0.91	53	65
	3/5/13	1,760	31	24	398	1.01	57	63
	5/16/13	1,570	26	20		1.07	60	60
	6/10/13	1,730	22	21		1.22	79	61
	7/15/13	1,360	20	21	371	1.22	68	61
	8/15/13	1,360	23	21	391	1.07	59	61
	9/9/13	1,590	27	31	361	1.01	59	66
	10/7/13	1,860	22	38	351	0.85	85	69
	11/12/13	1,950	21	56	342	0.70	93	75
	12/3/13	2,220	30	57	401	0.70	74	75
	1/15/14	2,530	27	62	381	0.61	94	76
	2/20/14	2,240	34	46	409	0.61	66	72
	3/10/14	2,400	32	51	371	0.61	75	73
	4/24/14	2,600	37	81	354	0.55	70	80
	5/7/14	2,610	36	84	360	0.55	73	81
	6/9/14	2,820	34	91	407	0.55	83	82
	7/17/14	2,620	34	86	364	0.55	77	81
	8/18/14	2,240	25	76	381	0.55	90	79
	9/11/14	2,500	23	66	363	0.61	109	77
	10/5/14	1,040	24	44	363	0.70	43	71
	11/24/14	2,510	26	42	356	0.76	97	71
	12/11/14	2,080	30	39	362	0.76	69	70

Historical Water Quality Data Collected in Lake Yale by LakeWatch from 1990 - 2016

Station Name	Date	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Cond. (µmho/cm)	Secchi Depth (m)	TN/TP Ratio	TSI (Chyl-a)
Yale	1/20/15	2,460	24	20	364	1.01	103	60
	2/11/15	2,180	29	7		1.46	75	45
	3/12/15	3,710	25	10		1.98	148	50
	4/8/15	2,680	17	8		1.83	158	47
	5/4/15	2,550	17	13		1.16	150	54
	6/4/15	1,910	28	26		0.76	68	64
	7/23/15	810	22	16	363	1.07	37	57
	8/28/15	1,710	31	27		0.85	55	64
	9/28/15	1,480	24	21		0.91	62	61
	10/26/15	1,970	29	36		0.91	68	68
	11/9/15	1,740	27	28		1.01	64	65
	12/10/15	1,400	27	30		0.91	52	66
	1/21/16	1,830	25	29		0.91	73	65
	3/24/16	1,740	19	24		1.01	92	63
	4/6/16	1,670	22	26		1.01	76	64
	5/18/16	1,470	17	16		1.31	86	57
	6/15/16	1,230	16	13		1.37	77	54
	7/14/16	1,400	16	16		1.22	88	57
	8/11/16		18	20		1.07		60
Lake Yale LakeWatch Annual Geometric Mean Values	1990	775	9	8		1.57	83	46
	1991	530	11	4		2.74	48	37
	1992	820	7	2		2.74	117	27
	1998	1,022	22	16		1.10	47	56
	1999	1,619	24	39		0.55	67	69
	2000	1,657	23	37		0.55	73	68
	2001	1,643	29	25		0.65	56	62
	2002	1,800	28	50		0.51	65	73
	2003	1,530	24	25		0.79	65	63
	2004	1,644	20	22		0.85	82	61
	2005	1,518	20	22		0.65	75	61
	2006	1,309	23	10		0.81	57	47
	2007	1,933	25	43	312	0.59	76	71
	2008	1,842	32	33	329	0.74	58	66
	2009	2,070	22	43	337	0.72	92	71
	2010	1,499	18	18	322	1.26	83	58
	2011	2,102	22	32	369	0.88	96	66
	2012	1,962	30	19	381	1.03	66	58
	2013	1,669	25	29	373	0.96	68	65
	2014	2,289	30	61	372	0.61	77	76
	2015	1,923	25	18	363	1.10	78	58
	2016	1,542	19	20		1.12	82	60

C.2 Lake County Data

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

Indicates data excluded from analyses

Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake County SWWQ - Lake Yale Center	1/9/92			160			1,290	20	2.0	4.00	1.0	2.3				65	27
	8/28/06		101		20	1,030	1,050	29	22.0	0.75	2.1	6.4	180	15.0		36	61
	11/28/06		104		30	2,010	2,040	20	16.0	0.75	2.6	8.0	215	11.0		102	57
	2/12/07		79.0		10	1,970	1,980	25	27.0	0.50	3.4	10.0	186	12.0		79	64
	8/28/07		115		20	1,540	1,560	60	11.0	0.60	2.5	13.0	217	13.0		26	51
	11/26/07		103		50	1,830	1,880	60	4.0	0.80	2.5	5.3	222	14.0		31	37
	2/12/08		105		10	1,700	1,710	140	7.2	0.70		4.4	228	18.0		12	45
	8/25/08		84.4	50	20	2,420	2,440	50	22.0	0.50		15.4	189	15.0	20.0	49	61
	12/16/08		96.1		30	2,640	2,670	29	37.0	0.40		18.5	222	20.0	25.0	92	69
	2/17/09		87.6	50	10	2,510	2,520	16	36.0	0.40		15.8	229	15.0	23.0	158	68
	6/2/09		107		20	2,490	2,510	18	16.0	1.00		7.0	221	7.0	22.0	139	57
	8/17/09		105		20	1,410	1,430	12	12.0	0.75		9.7	213	7.0	18.0	119	53
	9/14/10	29.3	107		20	1,470	1,490	35	7.5	0.80		4.8	200	13.0	17.0	43	46
	12/16/10		94.0		60	1,280	1,340	19	16.0	0.35				14.0	19.0	71	57
	3/16/11	20.3	93.2		50	1,310	1,360	19	19.0	0.70		5.1	215	11.0	21.0	72	59
	5/20/11	27.0	108		20	1,990	2,010	50	16.0	0.55					23.0	40	57
	6/22/11	31.0	105		30	2,250	2,280	47	28.0	0.70		11.0			22.0	49	65
	7/11/11	30.0	108		20	2,090	2,110	68	21.0	0.60		10.0			22.0	31	61
	8/24/11		126		50	1,900	1,950	18	14.0	0.70		9.0			22.0	108	55
	9/21/11	29.0	109		20	2,050	2,070	26	1.0	0.80		5.2			19.0	80	17
	10/14/11	25.0			10	9,720	9,730	18	2.2	1.00					29.0	541	28
	11/16/11	22.0	134		80	1,890	1,970	55	1.0	0.90					18.0	36	17
	12/15/11	20.0			20	2,470	2,490	42	1.0	1.00		3.5			19.0	59	17
	1/17/12	15.0	118		70	1,940	2,010	41	1.2	0.85		6.2			18.0	49	19
	2/23/12	21.0	111		70	2,720	2,790	112	15.0	1.10		6.1			20.0	25	56
	3/13/12	21.0	124		70	2,670	2,740	36	1.0	1.10		6.1			19.0	76	17
	4/13/12	24.0	136		60	2,130	2,190	18	11.0	0.95					20.0	122	51
	6/13/12	28.0	116		10	1,750	1,760	74	2.2	0.90		6.7			20.0	24	28
	7/10/12	30.0	112		20	1,420	1,440	27	9.5	0.85		4.4			18.0	53	49
	8/8/12	30.0	108		50	1,370	1,420	32	5.0	0.90		2.5			20.0	44	40
	9/13/12	27.0	106		60	1,270	1,330	18	4.7	0.65		10.0			23.0	74	39
	10/8/12	28.0			10	1,580	1,590	18	19.0	0.60		0.0			22.0	88	59
	11/14/12	20.0	120		20	1,450	1,470	19	5.5	0.65		6.0			22.0	77	41
	1/29/13	20.0	129		20	1,570	1,590	28	3.6	0.85		3.4			20.0	57	35
	2/11/13	19.0	113		10	2,050	2,060	48	5.6	0.80		7.6			22.0	43	42
	3/5/13	15.0	135		40	1,180	1,220	22	2.7	0.90		0.0			20.0	55	31
	5/16/13	26.0			20	1,480	1,500	34	1.0	0.85		3.2			21.0	44	17
	6/10/13	29.0			80	1,480	1,560	27	5.7	0.95		2.7			20.0	58	42
	7/15/13	30.0	140		30	1,300	1,330	26	3.9	1.00		7.7			19.0	51	36
	8/15/13	32.0	124		10	1,360	1,370	20	3.0	0.95		5.4			2.4	69	33
	9/9/13	30.0	117		20	1,630	1,650	25	1.0	0.90		8.2			20.0	66	17
	10/7/13	29.0	113		40	1,990	2,030	38	8.8	0.70		9.9			21.0	53	48
	11/12/13	24.0	104		20	2,030	2,050	26	11.0	0.60		11.8			23.0	79	51
	12/3/13	19.0			20	2,290	2,310	26	21.0	0.60		8.9			22.0	89	61

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

Indicates data excluded from analyses

Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake County SWWQ - Lake Yale Center	1/15/14	16.0	110		80	2,630	2,710	62	13.0	0.52		15.2			26.0	44	54
	2/20/14	19.0	117		20	2,560	2,580	34	5.6	0.55		13.4			24.0	76	42
	3/10/14	19.0			30	2,710	2,740	57	38.0	0.55		0.0			24.0	48	69
	4/24/14	23.0	111		50	1,820	1,870	19	29.0	0.45		15.5			22.0	98	65
	5/7/14	27.0	110		20	2,670	2,690	32	30.0	0.45		14.5			2.4	84	66
	6/9/14	30.0	100		40	2,310	2,350	174	23.0	0.45		24.0			24.0	14	62
	7/17/14	29.0	93.5		30	2,170	2,200	50	43.0	0.50		13.2			23.0	44	71
	8/18/14	30.0	102		10	1,750	1,760	18	12.0	0.50		12.1			25.0	98	53
	9/11/14	30.0	121		20	2,180	2,200	50	34.0	0.56		10.5			25.0	44	68
	10/6/14	25.0			30	2,300	2,330	90	16.0	0.70		10.8			20.0	26	57
	11/24/14	19.0	125		30	1,740	1,770	23	25.0	0.70		7.6			21.0	77	63
	12/11/14	18.0	107		10	1,460	1,470	55	33.0	0.70		4.8			20.0	27	67
	1/20/15	17.0	120		20	2,110	2,130	41	11.0	0.90		0.0			21.0	52	51
	2/11/15	15.0	118		20	1,770	1,790	34	1.0	1.30		3.6			15.0	53	17
	3/12/15	23.0	134		50	2,390	2,440	30	2.4	1.90		2.1			17.0	81	29
	4/8/15	25.0	130		60	2,550	2,610	12	5.0	1.80		0.6			18.0	218	40
	6/4/15	29.0	124		70	1,540	1,610	12	15.0	0.70		14.1			22.0	134	56
	7/23/15	31.0	122		20	1,350	1,370	28	11.0	0.90		4.8			21.0	49	51
	8/28/15	31.0	115		20	1,260	1,280	24	15.0	0.75		4.8			19.0	53	56
	10/26/15	25.0	113		30	1,810	1,840	31	6.0	0.80		5.8			24.0	59	43
	11/9/15	26.0	113		88	1,500		62	16.0	0.85		6.7			24.0		57
	12/10/15	21.0	120		70	1,920	1,990	23	3.7	0.82		3.6			21.7	87	36
	3/24/16	22.0	126		80	1,400	1,480	24	10.0	0.90		7.3			23.0	62	50
	4/6/16		121		10	1,590	1,600	31	13.0	0.85		10.2			23.0	52	54
	5/18/16		129		50	1,520	1,570	34	10.0	1.20		6.5			23.0	46	50
	6/15/16		129		30	1,590	1,620	26	2.7	1.20		4.1			22.0	62	31
	7/14/16		130		40	1,220	1,260	6	4.0	1.10		3.4			18.0	210	37
	8/11/16		133		30	1,420	1,450	9	1.0	1.00		5.2			21.0	161	17
	9/7/16		131		90	1,550	1,640	50	2.7	0.95		6.0			21.0	33	31
Annual Geometric Mean Values	1992			160			1,290	20	2.0	4.00	1.0	2.3				65	27
	2006		102			1,439	1,464	24	18.8	0.75	2.3	7.2	197	12.8		61	59
	2007		97.8			1,771	1,797	45	10.6	0.62	2.8	8.8	208	13.0		40	49
	2008		94.9	50		2,215	2,233	59	18.0	0.52		10.8	212	17.5	22.4	38	58
	2009		100	50		2,066	2,084	15	19.0	0.67		10.2	221	9.0	20.9	138	59
	2010	29.3	100		35	1,372	1,413	26	11.0	0.53		4.8	200	13.5	18.0	55	51
	2011	25.2	111		28	2,348	2,389	34	5.6	0.76		6.7	215	11.0	21.5	70	36
	2012	23.9	116		35	1,767	1,810	32	5.0	0.84					20.1	56	37
	2013	19.0			20	2,290	2,310	26	21.0	0.60		8.9			22.0	89	61
	2014	23.2	109		26	2,153	2,183	45	22.0	0.55					19.1	49	61
	2015	23.7	121		38	1,775	1,848	27	6.4	1.01					20.1	76	41
	2016	22.0	128		39	1,464	1,512	21	4.5	1.02		5.8			21.5	72	36

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

Indicates data excluded from analyses

Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake County SWWQ - Lake Yale North Center	5/12/82	26.0		100			420	10		2.33	1.0					42	
	6/22/82	29.0		100			540	10		2.20	1.6					54	
	7/21/82	29.0		130			740	20		2.20	1.0					37	
	8/20/82	29.0		100			500	10		1.50	1.0					50	
	11/10/82	20.0		100			660	430		1.50	1.0					2	
	11/30/82	23.0		100			70	210		2.13	1.0					0	
	2/25/83	18.0		100			400	20	1.0	4.30	1.0					20	17
	3/30/83			10			530	10	3.6	1.83	1.4	1.4				53	35
	9/1/83	29.0		110			560	10	6.4	3.10	1.0	1.0				56	44
	2/16/84			130			690	10	2.6		1.0	1.0				69	31
	1/11/85	16.0		100			1,020	30	1.0	1.25	1.3	2.4				34	17
	4/16/85	22.0		100			600	20	20.0	1.75	2.0	2.8				30	60
	4/3/86	22.0		160			1,080	20	23.0	1.75	1.7	3.4				54	62
	11/20/86	27.0		100			1,200	10	19.0	1.10	1.8	3.6				120	59
	5/13/87			80			1,300	180	1.0		1.0	13.0				7	17
	10/7/87	24.0		40			780	20	40.1	1.50	1.2					39	70
	3/10/88	18.5		260			910	20	7.4	2.50	1.1	1.3				46	46
	5/27/88	25.5		220			940	10	22.0	1.75	1.6	1.5				94	61
	9/15/88	29.0		20			980	10	13.4	1.50	1.0	1.6				98	54
	2/1/89	20.1		1,000			800	10	8.0	3.50	8.5	1.1				80	47
	4/26/89	24.6		100			720	10	1.0	2.75	1.0	0.9				72	17
	8/15/89	29.7		140			960	20	9.5	1.50	2.2	1.5				48	49
	11/15/89	23.4		60			940	10	7.4	1.50	1.1	1.8				94	46
	2/20/90	21.7		100			540	10	6.0	2.50	1.4	1.6				54	43
	6/11/90	29.0		240			1,230	20	6.0	1.90	1.0	1.3				62	43
	8/22/90	30.1		180			930	10	10.0	1.50	1.0	3.4				93	50
	11/7/90	25.1		250			1,160	50	6.7	1.50	1.0	2.7				23	44
	2/13/91	17.0		100			760	10	10.3	2.33	1.0	2.3				76	50
	5/8/91	27.8		200			930	10	3.0	2.25	1.0	1.6				93	33
	9/16/91	30.7		100			820	10	5.5	2.00	1.2	3.2				82	41
	11/13/91	16.8		140			1,070	10	3.3	2.25	1.4	2.5				107	34
	1/9/92	15.9		150			1,290	10	6.5	4.00	1.0	2.6				129	44
	3/23/92	19.0		10			730	10		3.25	1.0	1.5				73	
	7/15/92	31.5		310			1,130	10	27.6	2.25	1.8	2.5				113	65
	10/9/92	24.6		310			1,310	10	16.2	1.25	0.7	4.8				131	57
	2/4/93	15.6		160			1,020	30	10.0	1.75	1.1	3.0				34	50
	6/9/93	31.5		210			1,010	10	3.5	2.00	1.0	1.0				101	35
	9/22/93	29.6		160			1,070	10	12.0	1.25	1.2	5.0				107	53
	1/25/94	13.8		100			130	10	1.0	2.25	1.0	3.5				13	17
	3/29/94	24.0		230			1,200	10	26.5	2.06	1.1	2.3				120	64
	7/13/94	29.7		190			1,050	20	1.0	1.38	1.0	3.0				53	17
	10/5/94	25.7		180			460	20	14.5	1.25	1.0	2.5				23	55
	1/12/95	16.2		100			1,010	10	7.0	1.50	2.0	1.8				101	45
	4/5/95	21.5		150			1,140	10	7.0	1.75	1.9	1.7				114	45
	9/6/95	28.5		100			1,200	100	8.5	1.00	1.8	2.5				12	48
	11/9/95	21.9						50	1.0	1.00	1.3	4.1					17

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

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Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake County SWWQ - Lake Yale North Center	2/13/96	14.4			10	970	980	80	19.5	1.00		3.1		1.3		12	60
	5/15/96	26.9			10	1,310	1,320	40	12.7	1.20		3.1		4.3		33	53
	8/15/96	28.8			10	1,080	1,090	140	47.7	0.80		3.9		3.6		8	72
	11/19/96	20.1			40	1,690	1,730	80	9.4	0.75		4.5		15.0		22	49
	2/12/97	17.1			30	1,700	1,730	10	16.6	0.60		6.9		10.8		173	57
	5/15/97	24.8			10	2,310	2,320	30	26.1	0.50		6.6		15.0		77	64
	8/13/97	30.6			10	1,850	1,860	60	14.0	0.45		6.8		31.4		31	55
	11/17/97	19.1			10	700	710	70	14.0	0.75		3.5		14.0		10	55
	2/11/98	14.6			20	2,450	2,470	70	8.0	1.50		2.7		3.5		35	47
	5/13/98	25.8			10	1,280	1,290	10	10.2	1.25		2.0		14.0		129	50
	8/12/98	30.4			10	750	760	20	4.0	1.50		1.7		5.0		38	37
	2/10/99	20.8			20	1,520	1,540	20	26.1	0.70		5.7		6.0		77	64
	5/12/99	26.2			20	1,470	1,490	30	36.5	0.50		4.5		16.0		50	69
	8/12/99	29.6			20	1,630	1,650	70	44.7	0.50		5.6		28.6		24	72
	11/10/99	20.7			10	1,940	1,950	50	49.4	0.40		6.5	199		15.2	39	73
	2/10/00	13.9	116		20	1,780	1,800	40	12.6	0.75		5.0	230		17.5	45	53
	6/21/00	30.7	133		20	2,060	2,080	40	35.8	0.62		8.1	210		18.7	52	68
	8/9/00	31.6	126		10	1,340	1,350	30	27.8	0.75		3.7	220		18.0	45	65
	11/2/00	24.0	127		20	1,190	1,210	40	19.8	0.75		3.2	229		17.1	30	60
	3/12/01	19.0	135		30	1,770	1,800	30	16.9	1.10		3.0	187		16.6	60	58
	3/5/03	19.7	122		90	1,510	1,600	40	14.8	1.36		2.6	213			40	56
	6/23/03	27.8	108		10	1,060	1,070	40	19.6	1.00		4.2	210			27	60
	10/7/03	26.7	104		10	1,530	1,540	30	29.9	0.50		2.8	193			51	66
	6/10/04	29.2	111						19.4	0.75		2.8		211			59
Annual Geometric Mean Values	1982	25.8		104			396	35		1.94	1.1					11	
	1983	22.8		48			491	13	2.8	2.90	1.1	1.2				39	30
	1984			130			690	10	2.6		1.0	1.0				69	31
	1985	18.8		100			782	24	4.5	1.48	1.6	2.6				32	32
	1986	27.0		100			1,200	10	19.0	1.10	1.8	3.6				120	59
	1987	24.0		57			1,007	60	6.3	1.50	1.1	13.0				17	34
	1988	23.9		105			943	13	13.0	1.87	1.2	1.5				75	53
	1989	24.2		170			849	12	4.9	2.16	2.1	1.3				71	36
	1990	26.3		181			920	18	7.0	1.81	1.1	2.1				52	45
	1991	22.2		129			887	10	4.9	2.20	1.1	2.3				89	39
	1992	22.0		110			1,087	10	14.3	2.46	1.1	2.6				109	54
	1993	24.4		175			1,033	14	7.5	1.64	1.1	2.5				72	45
	1994	22.4		167			524	14	4.4	1.68	1.0	2.8				37	32
	1995	21.6		114			1,114	27	4.5	1.27	1.7	2.4				52	36
	1996	21.8			14	1,234	1,250	77	18.3	0.92		3.6		4.2		16	58
	1997	22.3			13	1,502	1,517	34	17.1	0.56		5.7		16.3		45	58
	1998	22.5			13	1,330	1,343	24	6.9	1.41		2.1		6.3		56	44
	1999	24.0			17	1,630	1,648	38	38.1	0.51		5.5	199	14.0	15.2	43	69
	2000	23.9	125		17	1,555	1,573	37	22.3	0.72		4.7	222		17.8	42	61
	2001	19.0	135		30	1,770	1,800	30	16.9	1.10		3.0	187		16.6	60	58
	2003	24.5	111		21	1,348	1,381	36	20.5	0.88		3.1	205			38	60
	2004	29.2	111						19.4	0.75		2.8		211			59

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

Indicates data excluded from analyses

Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake Yale NW	5/15/01	29.3								0.25							
	8/14/01	33.4								0.35							
Lake County SWWQ - Lake Yale South Center	5/12/82	25.0		100			590	10		2.22	1.0					59	
	6/22/82	30.0		100			610	10		2.00	1.5					61	
	7/21/82	28.0		130			750	10		2.20	1.0					75	
	8/20/82	29.0		100			490	10		1.50	1.0					49	
	11/10/82	20.0		100			580	620		1.50	1.0					1	
	11/30/82	23.0		100			540	250		2.13	1.0					2	
	2/25/83	18.0		100			390	40	1.0	4.00	1.0					10	17
	3/30/83			100			620	20	2.8	2.13	2.0	1.5				31	32
	9/1/83	29.0		100			470	10	4.4	3.10	1.0	1.2				47	38
	1/11/85	17.0		100			1,060	30	1.0	1.25	1.3	2.4				35	17
	4/15/85	22.0		100			800	30	1.0	1.75	1.9	2.0				27	17
	4/3/86	23.0		240			1,440	20	9.0	1.20	1.5	3.1				72	48
	11/20/86	26.0		80			780	20	17.0	1.00	1.8	7.3				39	58
	5/13/87			100			840	10	1.0		1.0	11.0				84	17
	10/7/87	23.0		20			760	20	28.1	1.75	1.2					38	65
	3/11/88	17.0		740			1,460	20	7.0	1.75	1.2	1.6				73	45
	5/27/88	25.0		80			740	10	9.0	2.00	1.7	1.5				74	48
	9/15/88	29.0		20			1,020	10	14.0	1.25	1.0	1.7				102	55
	2/1/89	19.7		1,000			820	10	20.0	3.00	8.4	1.1				82	60
	4/26/89	24.8		100			640	10	4.0	3.00	1.0	0.9				64	37
	8/15/89	29.7		140			1,000	20	8.0	1.50	1.0	1.6				50	47
	11/15/89	23.0		80			980	10	5.3	1.50	1.0	1.9				98	41
	2/21/90	21.3		100			500	20	6.0	2.25	1.6	1.5				25	43
	6/12/90	29.0		170			1,110	20	5.7	1.75	1.0	1.4				56	42
	8/22/90	30.6		100			840	10	13.4	1.25	1.0	3.0				84	54
	11/7/90	24.2		170			1,130	10	6.0	2.00	1.0	2.3				113	43
	2/13/91	17.0		220			1,670	10	5.7	2.25	1.0	1.7				167	42
	5/8/91	27.6		200			1,000	10	3.0	1.90	1.0	1.8				100	33
	9/16/91	30.5		100			770	10	6.0	1.75	1.9	4.8				77	43
	11/13/91	16.3		140			950	20	6.0	2.00	1.9	3.4				48	43
	1/9/92	16.0		140			1,300	10	5.2	2.75	1.2	2.6				130	41
	3/23/92	18.9		10			670	10		3.00	1.0	2.3				67	
	7/15/92	31.2		360			1,160	10	1.0	2.25	1.1	3.0				116	17
	10/9/92	23.7		420			1,380	10	17.7	1.25	1.0	5.0				138	58
	2/4/93	15.4		200			1,140	40	1.5	1.75	1.0	2.0				29	23
	6/9/93	30.6		170			730	10	1.5	2.00	1.0	1.0				73	23
	9/22/93	28.8		150			1,100	10	12.0	1.25	1.0	5.0				110	53
	1/25/94	13.7		100			970	10	1.0	2.25	1.0	3.0				97	17
	3/29/94	23.6		230			1,130	20	4.8	2.00	1.1	2.4				57	39
	7/13/94	29.7		100			990	20	13.4	1.38	1.2	3.5				50	54
	10/5/94	25.9		140			140	20	4.5	1.35	1.0	2.5				7	38
	1/12/95	16.3		100			970	10	18.0	1.50	1.7	1.8				97	58
	4/5/95	21.6		250			1,160	10	5.3	1.75	1.8	1.7				116	41
	9/6/95	28.3		100			1,290	20	10.7	1.00	1.9	2.8				65	51
	11/9/95	21.5						30	21.8	0.60	1.3	5.0					61

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

Indicates data excluded from analyses

Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake County SWWQ - Lake Yale South Center	2/13/96	14.4			10	1,220	1,230	70	8.5	1.00		3.5		4.0		18	48
	5/15/96	26.4			10	1,180	1,190	40	14.4	1.25		3.2		4.0		30	55
	8/15/96	28.8			10	1,180	1,190	160	18.0	0.80		3.2		6.0		7	58
	11/19/96	20.1			40	1,600	1,640	60	14.1	0.75		4.7		12.5		27	55
	2/12/97	17.2			10	1,780	1,790	10	24.5	0.50		5.5		9.3		179	63
	5/15/97	26.0			20	2,250	2,270	50	13.4	0.50		8.1		10.0		45	54
	8/13/97	30.1			10	1,990	2,000	90	17.4	0.50		6.4		37.5		22	58
	11/17/97	18.5			10	1,810	1,820	100	20.7	0.75		4.2		12.0		18	60
	2/11/98	14.4			20	2,250	2,270	70	4.5	1.75		2.7		3.0		32	38
	5/13/98	26.9			20	1,010	1,030	10	10.7	1.35		2.0		9.0		103	51
	8/12/98	31.3			10	660	670	20	2.5	1.75		1.8		2.0		34	30
	2/10/99	21.2			20	1,670	1,690	20	22.4	0.70		5.1		6.0		85	62
	5/12/99	25.9			20	2,030	2,050	20	29.8	0.55		5.4		8.6		103	66
	8/12/99	29.5			20	1,730	1,750	30	37.0	0.40		5.5		27.5		58	69
	11/10/99	20.8			10	1,850	1,860	50	29.4	0.45		6.4	124		19.5	37	65
	2/10/00	14.5	117		20	1,880	1,900	40	19.9	0.75		5.2	209		18.5	48	60
	6/21/00	29.6	134		40	2,030	2,070	40	36.0	0.62		6.9	205		17.7	52	68
	8/9/00	30.7	128		20	1,300	1,320	50	26.0	0.75		3.9	219		17.8	26	64
	11/2/00	24.0	133		20	1,250	1,270	50	8.5	0.75		3.0	245		16.5	25	48
	3/12/01	18.9	137		70	1,620	1,690	90	20.0	1.10		2.8	208		17.0	19	60
	3/5/03	20.0	116		90	1,400	1,490	30	16.4	1.50		1.8	218			50	57
	6/23/03	27.8	105		10	1,520	1,530	100	18.4	1.00		4.2	208			15	59
	10/7/03	25.7	103		10	1,400	1,410	30	35.0	0.75		3.8	197			47	68
	6/10/04	28.9	111					30	28.0	0.85		2.9		203.0			65
	10/21/14	21.0	73.1		65	960	1,030	299	1.0	0.30		11.9			25.0	3	17
	11/17/14	18.0	73.7		8	1,590	1,590	85	1.0	0.30		1.6			17.0	19	17
	12/16/14	10.5	57.2		29	1,300	1,330	142	1.0	0.35		5.6			24.0	9	17
	1/26/15	13.0	63.1		20	840	850	217	1.0	0.40		2.0			23.0	4	17
	2/23/15	16.0	87.3		20	960	980	106	2.1	0.40		0.9			15.0	9	27
	3/24/15	21.0	87.1		34	1,080	1,110	880	3.9	0.30		8.0			21.0	1	36
	4/27/15	24.5	90.6		25	770	790	696	9.0	0.40		4.3			17.0	1	48
	6/23/15	28.0	96.7		39	930	970	390	9.4	0.35		13.9			19.0	2	49
	7/28/15	26.0	56.7		24	720	740	450	1.0	0.50		1.9			26.0	2	17
	8/25/15	27.0	66.8		20	930	940	322	1.0	0.65		2.0			18.0	3	17
	1/26/16	10.0	72.8		20	650	670	91	1.0	0.40		2.7			10.0	7	17
	2/24/16	19.0	74.9		20	1,170	1,180	274	1.0	0.90		1.7			19.0	4	17
	3/29/16	21.0	69.9		34	930	960	488	1.0	0.80		2.3			17.0	2	17
	4/26/16	22.0	95.2		10	1,120	1,120	372	34.0	0.70		5.5			21.0	3	68
	5/24/16	26.0	98.2		19	1,230	1,250	506	2.4	0.70		3.6			20.0	2	29
	6/27/16	28.0	98.5		20	970	990	262	1.0	0.70		3.8			16.0	4	17
	7/25/16	27.0	92.5		36	910	950	337	1.0	0.60		2.2			14.0	3	17
	8/23/16	28.0	101		26	920	940	434	1.0	0.60		2.3			13.0	2	17
	9/27/16	25.0	103		10	840	840	525	1.3	0.50		9.8			16.0	2	21

Historical Water Quality Characteristics in Lake Yale from 1982 - 2016 (Lake County SWWQ)

Indicates data excluded from analyses

Station	Date	Temp. (°C)	Alkalinity (mg/L)	NH_4 (µg/L)	NOx (µg/L)	TKN (µg/L)	Total N (µg/L)	Total P (µg/L)	Chyl-a (mg/m^3)	Secchi (m)	BOD_5 (mg/L)	Turbidity (NTU)	TDS (mg/L)	TSS (mgl)	TOC (mg/L)	TN/TP Ratio	TSI (Chyl-a)
Lake County SWWQ - Lake Yale South Center - Annual Geometric Mean Values	1982	25.6		104			588	34		1.9	1.1					17	
	1983	22.8		100			484	20	2.3	3.0	1.3	1				24	27
	1985	19.3		100			921	30	1.0	1.5	1.6	2				31	17
	1986	24.5		139			1,060	20	12.4	1.1	1.6	5				53	53
	1987	23.0		45			799	14	5.3	1.8	1.1	11				56	33
	1988	23.1		106			1,033	13	9.6	1.6	1.3	2				82	49
	1989	24.0		183			847	12	7.6	2.1	1.7	1				71	45
	1990	26.0		130			852	14	7.2	1.8	1.1	2				60	45
	1991	22.0		158			1,051	12	5.0	2.0	1.4	3				88	40
	1992	21.7		121			1,087	10	4.5	2.2	1.1	3				109	34
	1993	23.9		172			971	16	3.0	1.6	1.0	2				61	30
	1994	22.3		134			624	17	4.1	1.7	1.1	3				37	34
	1995	21.7			14	1,284	1,300	72	13.3	0.9		4		6		18	54
	1996	21.7			14	1,284	1,300	72	13.3	0.9		4		6		18	54
	1997	22.3			12	1,949	1,961	46	18.5	0.6		6		14		43	59
	1998	23.0			16	1,145	1,161	24	4.9	1.6		2		4		48	39
	1999	24.1			17	1,815	1,833	28	29.2	0.5		6	124	11	19.5	66	65
	2000	23.7	128		24	1,578	1,602	45	19.9	0.7		5	219		17.6	36	59
	2001	18.9	137		70	1,620	1,690	90	20.0	1.1		3	208		17.0	19	60
	2003	24.3	108		21	1,439	1,476	45	21.9	1.0		3	207			33	61
	2004	28.9	111					30	28.0	0.9		3		203			65
	2014	15.8	67.5		25	1,257	1,296	153	1.0	0.3		5			21.7	8	17
	2015	21.5	76.9		25	883	904	361	2.5	0.4		3			19.6	3	27
	2016	22.0	88.6		20	956	974	330	1.7	0.6		3			15.9	3	21

C.3 SJRWMD Data

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD Water Quality Station 20020371	5/30/95	8.12	8.1	337	116		20	25	5.0	5.3		1.00		11.1	31.0	10			
	7/31/95	8.01	7.7	343	114		26	25	8.0	4.4	12.0	1.00		10.6	36.0	20			53
	9/20/95	7.98	7.9	325	111	1,206	16	75	6.0	5.5	17.5	0.90		11.3	36.0	40		75	58
	11/6/95	8.23	8.5	320	115	1,331		30	8.6	5.8	7.7	0.90		10.0	28.0	20			46
	1/22/96	7.98	9.9	320	194	1,241	26	100	8.0	7.8	18.7	1.10		9.6	32.0			48	59
	3/25/96	7.81	9.4	325	104	1,256	42	20	5.0	5.9	1.4	1.00		9.0	33.0			30	22
	5/20/96	7.78	7.7	310	103	1,321	23	10	6.0	5.0		1.00		9.3	29.0			57	
	7/30/96	8.28	7.1	327															
	9/24/96	8.44	8.0	325	112	1,394	20	10	8.0	3.7	15.6	0.90		9.9	34.0			70	56
	11/20/96	8.07	7.2	341	112	1,550	22	10	14.0	5.8	24.5	0.60		13.1	32.0	20		70	63
	1/7/97															20			
	3/19/97	8.47	8.5	349	120	1,087	26	15	11.0	5.4	31.3	0.70		15.1	36.0	40		42	66
	5/21/97	8.29	7.1	363	120	2,319	52	15	20.0	8.8	46.3	0.55		20.7	38.0	20		45	72
	7/28/97	7.81	5.5	365	120	2,640	27	10	16.0	6.2	44.4	0.50		16.2	37.0	10		98	71
	9/9/97	7.72	4.0	369	124	1,831	50	15	22.0	7.0	34.9	0.40		22.2	38.0	150		37	68
	11/12/97	7.93	8.1	363	128	2,028	26	50	17.0	6.4	4.0	0.90		21.0	37.0	6		78	37
	1/14/98	7.50	5.8	335	113	2,093	59	20	5.0	42.0	9.6	1.00		13.0	33.7	8		35	49
	2/24/98	7.84	8.2	312	96	2,381	49	25	15.0	7.5	8.0	0.80		12.4	32.0	22		49	47
	4/7/98	7.42	3.9	309	94	1,360	39	30	5.0	2.5	8.5	1.95		10.5	31.9	2		35	48
	5/20/98	7.54	6.2	324	103	1,053	26	30	5.0	2.5	9.6	1.25		14.8	36.0	2		41	49
	7/20/98	8.06	6.6	230	101	1,262	23	20	5.0	2.4		0.75		9.8	37.0	2		55	
	11/16/98	8.72	11.6	348	112	1,462	25	20	14.0	8.2		0.75		12.6	33.4		44	58	
	1/20/99	8.64	8.6	340	109	1,360	23	10	11.0	8.5	31.1	0.70		14.5	31.6		16	59	66
	3/18/99	8.90	9.5	355	112	1,653	37	20	14.0	10.3	28.0	0.65		16.4	34.7		32	45	65
	5/5/99	8.64	9.0	362	113	2,181	50	10	9.0	11.3	51.5	0.60		17.4	40.6		26	44	74
	7/28/99	8.75	7.4	363	118	1,962	40	10	9.0	9.4	34.4	0.55		15.8	37.0		29	49	68
	9/27/99	8.58	7.1	352	112	1,963	40	20	18.0	10.8	47.8	0.40		16.7	32.9		15	49	72
Annual Geometric Mean Values	1995	8.08	8.0	331	114	1,267	20	34	6.7	5.2	11.7	0.95		10.7	32.6	20		75	52
	1996	8.06	8.1	325	121	1,348	26	18	7.7	5.5	10.0	0.90		10.1	32.0	20		53	46
	1997	8.04	6.4	362	122	1,899	34	18	16.7	6.7	24.6	0.59		18.8	37.2	23		55	61
	1998	7.83	6.7	307	103	1,537	34	24	7.1	5.8		1.02		12.1	33.9	4	44	45	48
	1999	8.70	8.3	354	113	1,800	37	13	11.8	10.0	37.5	0.57		16.1	35.2		22	49	69

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD - LYC	10/3/85	8.00		335	115		19	15	5.0	2.5	13.9	1.37	2.1		30.0				55
	12/4/85	8.60	8.7	290	134	1,823	32	15	14.0	3.9	17.1		2.9		31.0			57	58
	2/5/86	8.50	10.9	320	113		13	20	6.0	3.8	17.1	1.12	2.4		24.0				58
	4/2/86	8.30	9.5	330	125	851	16	25	6.0	4.4	15.0	1.07	5.5		26.0			53	56
	6/3/86	8.80	9.0	320	123	1,008	5	5	3.0	2.8	7.8	1.65	3.2		27.0			202	46
	8/5/86	8.60	7.8	300	112		9	5	7.0	2.9	6.2	1.68	1.9		31.0				43
	10/8/86	8.40	7.7	280	117		11	15	7.0	5.3	10.8	1.04	2.4		30.0				51
	12/3/86	8.50	8.8	290	111	1,110	26	10	4.0	5.4	18.7	1.22	3.7		32.0			43	59
	2/4/87	6.60	9.4	280	119	1,061	13	15	10.0	3.3	5.0	1.52	0.7		36.0			82	40
	4/8/87	8.00	10.2	320	110	1,016	23	20	5.0	1.9	1.3	1.52	2.0		28.0			44	21
	6/3/87	8.50	9.0	370	106		12	15	1.0	1.4	1.7	1.22	1.2		29.0				25
	8/5/87	8.50	7.5	320	114	659	9	15	6.0	4.8	4.4	0.84	3.3		31.0			73	38
	10/8/87	5.50	8.6	300	113		5	15	1.0	1.8	4.3	1.91	1.9		30.0				38
	12/2/87	8.50	9.0	320	117		5	15	10.0	3.0	6.1	1.65	2.0		28.0				43
	2/3/88	8.50	11.0	330	115		14	30	3.0	1.4	2.9	2.74	1.3	11.1	29.0				32
	4/6/88	7.50	7.0	290	107		5	10	2.0	1.0	2.9	3.05	1.0	10.1	31.0				32
	6/9/88	9.00	8.8	305	99		5	15	3.0	1.7	7.1		1.1	10.4	33.0				45
	8/1/88	8.80	8.5	298	98		5	30	5.0	1.5	4.5		1.3	9.3	31.0				39
	10/6/88	8.30	7.5	300	117		9	50	4.0	2.8	8.5		1.8		30.0				48
	12/8/88	8.10	9.5	300	104		12	15	3.0	1.9		1.55	1.5	11.8	33.0				
	2/2/89	7.90	9.9	310	103		5	30	2.0	1.1			1.0	11.3	32.0				
	4/3/89	8.40	8.7	320	102		32	50	1.0	1.0	2.7		0.9	13.2	32.0				31
	7/20/89	8.30	7.7	310	101		5	5	4.0	2.1	7.1		1.6		33.0				45
	10/11/89	8.30	7.9	310	17	960	21	5	6.0	4.2	12.1		1.8		33.0			46	53
	12/5/89	8.00	9.6	330	108		14	10	5.0	2.5	5.9	2.13	1.3		35.0				42
	2/8/90	7.60	9.5	330	112		28	10	1.0	1.6	4.0	2.82	1.3	10.8	34.0				37
	3/28/90	8.40	8.9	340	16		5	10	5.0	1.5	5.3	2.13		11.0	163.0				41
	6/5/90	8.40	7.9	350	101		5	10	4.0	2.6	7.2	2.13	1.7	9.4	31.0				45
	8/15/90	8.30	7.6	330	105	1,017	5	10	6.0		13.1			9.5	29.0			203	54
	10/17/90	8.40	7.4	330	102		5	10	8.0	2.4	7.9	1.22	1.3	14.0	19.0				47
	12/5/90	8.10	9.1	330	120		5	10	4.0	2.7	7.8	1.58		12.1	30.0				46
	2/26/91	8.50	10.1	330	114	930	5	10	7.0	0.8	2.7	2.44		10.8	34.0			186	31
	4/15/91	8.30	8.9	331	106		14	15	12.0	1.0	3.5	2.79		9.6	29.0				35
	6/11/91	8.10	8.5	300	103		34	10	6.0	1.0	6.9	1.50		11.6	27.0				45
	8/14/91	8.30	7.6	300	96		5	10	33.0	2.0	7.2	2.00		13.0	26.0				45
	10/24/91	8.50	7.9	310	88		5	10	4.0	3.3	7.8			11.3	28.0				46
	12/18/91	7.80	9.2	300	100	874	10	10	2.0	1.8	1.5	3.00		10.4	28.0			87	23
	2/26/92	7.70	8.4	330	107	967	10	10	1.0	1.4	2.4			8.9	29.0			97	29
	4/28/92	8.20	8.1	330	112	911	24	10	3.0	1.6	2.9	2.25		9.3	27.0			38	32
	7/28/92	8.40	7.8	320	100		22	10	10.0	1.8	8.1	2.00		9.8	28.0				47
	9/24/92	8.60	8.8	310	107	1,093	21	10	4.0	4.2	12.3	1.00		9.0	29.0			52	53
	12/14/92	8.30	9.9	320	111		10	10	4.0	2.6	9.4	1.25		9.1	29.0				49
	2/16/93	8.20	9.6	320	115	853	14	10	6.0	2.1	5.3	2.75		9.8	28.0			61	41
	4/29/93	8.20	8.6	320	130	1,039	27	25	6.0	2.6	4.5	2.40		11.2	30.0			38	39
	6/24/93	8.10	5.8	370	119	1,029	9	10	8.0	1.9	5.3	2.50			39.0			114	41
	9/16/93	7.20	7.5	353	116	991	15	10	6.0	2.7	13.4	0.80		11.1	30.0			66	54
	11/30/93	8.46	8.8	343	118	962	15	10	7.0	2.7	8.3	1.10		13.7	31.0			64	47

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD - LYC	1/6/94	7.86	10.4	344	121	971	33	10	6.0	2.4	6.7	1.00		11.9	34.0			29	44
	3/24/94	8.15	9.0	335	121	1,054	11	10	2.0	0.9	2.4	2.70		11.8	33.0			96	29
	5/26/94	8.19	8.4	374	126	1,076	13	10	2.0	1.1	3.4	1.90		12.6	37.0			83	35
	7/18/94	8.28	8.0	363	127	1,053	4	10	27.0	2.4	9.9	1.50		10.3	37.0			263	50
	9/21/94	8.29	7.7	333	123	886	17	10	5.0	2.2	13.1	1.30		9.6	34.0			52	54
	11/9/94	8.35	8.8	332	114	1,071	11	10	6.0	2.0	9.4	1.30		10.6	34.0			97	49
	1/5/95		9.5	324	111	1,030	17	15	5.0	3.1	13.1	1.50		11.6	33.0			61	54
	3/6/95	8.21	9.3	325	113	951	9	15	2.0	2.3	8.3	1.50		12.6	35.0			106	47
	5/30/95				117	1,061	14	25	5.0	3.8				11.3	30.0		323	76	
	7/31/95	8.00	7.3	345	110	1,192	28	25	7.0	5.0	0.6	1.30		10.6	35.0		228	43	9
	9/20/95	7.90	7.4	324	111	1,066	20	75	8.0	5.8	24.1	1.00		10.3	35.0		23	53	63
	11/6/95	8.17	8.4	320	117	1,191	20	30	6.1	6.2	4.4	0.80		9.9	30.0		14	60	38
	1/22/96	8.05	9.9	321	152	1,211	15	50	15.0	4.6	14.0	1.30		9.8	36.0		28	81	55
	3/25/96	7.93	9.7	324	113	1,211	18	20	10.0	6.0	8.7	1.00		9.3	33.0		3	67	48
	5/20/96	7.91	9.1	310	113	1,261	11	10	7.0	5.4		1.00		11.6	36.0		9	115	
	7/30/96				112	1,234	41	10	8.0	6.1	21.4			6.9	37.0		16	30	61
	9/24/96	8.32	7.9	325	108	1,266	16	10	8.0	4.0	18.7	0.90		9.7	34.0		3	79	59
	11/20/96	8.30	8.7	340	110	1,580	22	10	11.0	5.3	22.9	0.60		13.1	33.0		3	72	62
	1/7/97	8.57	10.4	338	112	1,664	28	15	13.0	5.7	20.5	0.40		18.6	35.0		7	59	60
	3/19/97	8.52	8.6	349	116	2,105	53	15	9.0	5.6	33.6	0.70		14.7	36.0		8	40	67
	5/21/97	8.24	6.8	362	116	2,383	34	15	17.0	7.9	45.1	0.55		22.4	36.0		3	70	72
	7/28/97	7.95	6.4	364	118	2,479	35	10	15.0	6.2	43.3	0.50		15.8	37.0		56	71	71
	9/9/97	8.26	7.0	369	124	2,017	28	15	18.0	7.4	31.6	0.40		27.2	36.0		26	72	67
	11/12/97	8.06	8.8	362	131	2,066	26	70	13.0	6.6	12.0	0.75		13.4	37.0		29	79	53
	1/14/98	7.86	8.2	335	115	2,338	48	20	5.0	4.5	6.2	1.20		12.9	33.9		31	49	43
	2/26/98	7.41	7.9	315								1.73							
	3/31/98	7.73	7.8	311	99	1,640	19	30	5.0	1.9	5.9	2.22		9.7	34.0		17	86	42
	5/20/98	7.53	6.7	325	104	1,033	21	30	5.0	2.6	6.7	1.10		12.8	35.0		31	49	44
	7/20/98	8.14	7.9	331	107	980	22	20	12.0	1.9	3.6	1.60		10.7	36.0		26	45	35
	9/16/98	8.34	8.0	346	113	1,557	38	40	8.0	2.5	10.6	1.50		9.3	37.0		90	41	51
	11/16/98	8.73	11.9	347	112	1,501	26	20	16.0	6.2	1.7	0.75		13.0	33.3		42	58	24
	1/20/99	8.64	10.4	340	109	1,303	21	20	13.0	7.1	26.1	0.65		15.7	30.9		17	62	64
	2/26/99	8.44	12.7	338								0.75							
	3/18/99	8.93	9.5	354	112	1,785	33	20	12.0	8.2	23.6	0.65		16.4	34.6		31	54	62
	5/5/99	8.73	9.4	359	113	2,099	44	20	9.0	10.1	51.7	0.60		21.5	37.7		21	48	74
	5/20/99	8.56	5.9	354								0.52							
	6/25/99	7.73	1.1	352								0.71							
	7/28/99	8.74	7.5	363	118	2,142	34	10	12.0	10.7	37.5	0.55		17.4	35.9		32	63	69
	8/13/99	7.80	1.4	352								0.48							
	9/27/99	8.68	7.5	351	112	2,382	27	20	12.0	11.3	43.5	0.50		17.2	32.9		17	88	71
	10/13/99	6.87	0.6	339	111	1,936	2	20	5.0	10.4	47.7	0.65		17.0	32.0			968	72
	11/9/99	6.76	1.6	329		2,250	2		13.0		52.9	0.52						1125	74
	11/18/99	8.92	9.9	340	108	2,264	40	20	22.0	11.3	52.0	0.60		17.6	32.9		18	57	74
	12/14/99	8.36	8.0	330		2,118	14		8.0		46.1	0.60						151	72

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD - LYC	1/11/00	6.96	0.3	328	110	2,194	2	20	10.0	16.7	54.7	0.66		17.0	34.3		12	1097	74
	1/25/00	8.15	9.4	354	114	2,520	46	20	16.0	12.9	38.3	0.50		17.5	33.7		33	55	69
	2/23/00	7.42	6.6	317		2,211	2		5.0		25.8	0.88						1106	64
	3/15/00	7.62	4.8	315		2,156	1		5.0		44.3	0.52						2156	71
	3/21/00	8.87	9.1	359	114	2,580	30	20	10.0	22.0	55.2	0.40		17.5	36.0		20	86	75
	4/12/00	7.30	0.2	323	118	2,254	9	10	10.0	13.7	55.8	0.50		19.1	39.4			250	75
	5/10/00	8.01	0.8	355		2,438	4		20.0		43.0	0.44						610	71
	5/15/00	8.87	8.6	369	125	2,527	32	10	13.0	14.1	43.4	0.50		21.9	37.2		35	79	71
	6/15/00	7.86	0.2	351		2,238	6		13.0		35.1	0.54						373	68
	7/13/00	7.97	0.2	357	128	2,049	2	20	10.0	11.7	30.2	0.54		16.4	49.4			1025	66
	8/7/00	8.31	6.5	385	128	1,683	26	10	9.0	6.8	27.8	0.70		17.7	39.2		11	65	65
	8/16/00	7.64	0.4	346		1,764	2		13.0		30.5	0.57						882	66
	9/11/00	7.70	4.0	343		2,162	13		5.0		39.8	0.74						166	70
	9/27/00	8.79	8.1	377	125	1,621	21	10	6.0	8.4	31.1	0.60		16.5	38.0		24	77	66
	10/12/00	7.62	0.3	345	128	1,580	2	20	7.0	8.7	27.3	0.64		15.7	38.3			790	64
	11/9/00	8.62	8.4	394	129		24	10	11.0	7.0	21.2	0.65		15.0	42.3		24		61
	11/15/00	7.47	0.3	357		1,405	3		9.0		26.8	0.59						468	64
	12/13/00	7.24	2.0	352		1,416	2		10.0		19.0	0.75						708	59
	1/17/01	7.38	6.5	356	137	1,696	11	10	5.0	19.6	6.9	1.26		13.2	41.5		21	154	45
	1/25/01	8.13	10.2	406	137	1,982	28	10	5.0	4.7	11.8	1.20		16.0	41.6		42	71	52
	2/14/01	7.30	0.5	364		1,869	2		5.0		8.6	1.27						935	48
	3/15/01	8.46	9.1	423	145	1,964	26	10		4.7	20.9	0.75		13.3	45.2		36	76	61
	3/28/01	7.52	4.4	390		1,920	7		7.0		21.7	0.68						274	61
	4/11/01	7.44	0.6	382	131	1,690	7	10	15.0	5.1	18.4	0.98		14.8	40.6			241	59
	5/4/01	9.01	8.6	399	126	1,461	20	10		3.6	18.9	0.70		16.3	42.4		27	73	59
	5/16/01	7.48	0.2	388		1,610	5		20.0		16.3	1.10						322	57
	6/18/01	7.26	2.9	383		1,305	9		5.0		7.9	1.15						145	47
	7/18/01	7.16	0.7	365	124	1,445	1	30	6.0	5.0	14.7	0.78		15.0	43.9			1445	56
	7/30/01	9.09	9.1	382	119	1,447	30	10	11.0	5.6	13.8	0.70		14.8	44.9		8	48	55
	8/15/01	7.18	0.5	341		1,594	2		10.0		26.3	0.55						797	64
	9/12/01	9.19	6.9	357	103	2,129	44	10	26.0	16.5	71.3	0.40		21.4	47.9		34	48	78
	9/19/01	6.97	0.4	294		2,171	5		16.0		59.7	0.55						434	76
	10/10/01	7.15	0.5	338	99	2,198	9	30	8.0	15.8	79.1	0.40		22.6	38.5			244	80
	11/19/01	8.66	7.2	357	104	2,913	36	30		16.9	90.0	0.40		22.3	39.9		22	81	82
	12/12/01	7.24	0.6	344	108	2,566	6	30	11.0	14.5	71.4	0.45		20.7	39.4		7	428	78
	1/17/02	7.10	1.6	333	114	2,659	2	20	11.0	12.5	32.9	0.55		21.6	40.9		13	1330	67
	3/11/02	7.26	3.5	365	115	2,673	6	20	12.0	15.7	77.9	0.60		20.8	39.8		3	446	80
	5/20/02	6.86	0.2	402	129	2,779	9	20	14.0	9.6	44.3	0.60		23.6	42.5		17	309	71
	7/11/02	7.18	4.1	383	123	2,276	15	20	7.0	9.6	47.2	0.65		18.2	39.3		10	152	72
	9/18/02	7.42	0.8	366	118	2,059	1	30	12.5	10.7	42.7	0.60		21.4	38.1		7	2059	71
	11/14/02	7.15	0.4	377	121	2,198	12	20	11.5	9.5	7.2	0.45		20.9	39.7		5	183	45

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD - LYC	1/16/03	7.32	1.8	330	114	2,621	6	20	8.5	6.8	17.0	0.70		20.0	38.0		19	437	58
	2/12/03	7.40	1.8	356	123	2,376	7	20	6.5	3.1	7.8	1.60		18.5	38.5		11	339	46
	3/13/03	7.27	0.5	342	119	2,193	14	30	8.0	5.2	19.0	1.10		17.1	36.4		10	157	59
	4/16/03	8.07	7.9	318	119	1,768	8	30	8.0	5.1	19.5	1.10		17.3	35.6		12	221	60
	5/21/03	8.49	6.0	342	121	1,559	7	30	9.5	4.6	15.2	1.10		19.8	37.2		6	223	56
	6/18/03	8.53	6.0	338	121	1,452	7	20	9.5	3.4	13.1	0.90		18.8	37.8		12	207	54
	7/23/03	8.51	7.4	330	118	1,530	19	30	10.5	4.5	18.6	0.95		18.2	35.8		13	81	59
	8/20/03	8.57	6.2	316	112	1,664	2	30	11.5	5.2	34.3	0.65		21.4	36.0		6	832	68
	9/17/03	8.58	7.0	320	114	1,860	9	30	11.5	16.8	40.7	0.55		16.2	36.6		11	207	70
	10/23/03	8.54	7.0	317	112	1,849	7	20	10.0	7.6	28.8	0.50		20.4	33.9		24	284	65
	11/19/03	8.27	8.1	318	109	2,146	1	20	12.5	8.5	46.7	0.70		23.0	34.6		14	1973	72
	12/22/03	8.03	9.3	337	113	2,073	6	20	10.0	8.4	25.7	0.65		22.5	37.2		5	345	64
	1/21/04	7.99	8.3	331	121	2,175	4	20	0.5	4.0	12.4	1.10		23.2	35.0		10	539	53
	2/26/04	7.96	8.3	305	123	2,169	4	20	3.0	3.7	16.4	1.20		18.8	35.5		3	485	57
	3/24/04	7.91	7.9	306	122	2,064	9	20	4.5	3.1	10.1	1.35		19.6	35.1		3	234	50
	4/21/04	8.01	6.6	311	118	1,910	10	20	6.0	4.0	21.9	1.00		17.1	36.0		7	193	61
	5/19/04	8.41	7.7	310	115	1,603	6	20	8.5	6.5	26.7	0.60		18.4	35.6		3	287	64
	6/23/04	7.86	5.7	316	112	1,494	9	20	9.5	5.7	25.9	0.90		16.5	35.5		9	166	64
	7/22/04	6.88	2.5	323	116	1,458	3	20	9.0	4.9	18.8	1.00		18.3	37.2		10	424	59
	8/25/04	8.06	8.0	313	111	1,493	7	20	11.5	5.4	23.7	0.80		17.5	34.3		11	202	62
	9/16/04	8.33	7.6	290	102	1,661	3	20	13.0	8.9	44.2	0.50		18.3	34.1		6	631	71
	9/29/04	7.79	6.5	272	99	1,893	7	30	15.5	6.7	53.0	0.60		17.3	30.8		43	269	74
	10/20/04	8.34	7.7	271	97	1,817	11	30	13.0	9.1	61.8	0.60		20.4	33.3		14	168	76
	11/16/04	7.50	5.1	271	97	1,973	9	40	13.3	11.5	87.0	0.55		20.1	33.7		3	228	81
	12/21/04	8.59	9.4	314	98	2,064	1	30	10.0	12.0	56.7	0.60		24.5	33.8		5	1921	75
	1/19/05	8.38	8.3	313	96	2,091	4	40	9.5	12.1	46.1	0.45		20.3	32.6		3	534	72
	2/23/05	7.86	7.0	320	100	2,072	2	30	6.5	14.0	42.4	0.45		21.8	33.3		3	1036	71
	3/23/05	8.40	8.5	322	97	2,092	6	30	6.5	10.7	39.3	0.50		19.1	33.6		5	349	70
	4/20/05	8.49	8.6	325	100	2,066	11	30	6.0	9.7	36.7	0.55		24.9	34.8		4	196	69
	5/26/05	8.10	5.7	333	100	2,032	8	30	7.0	7.5	33.0	0.85		21.6	31.6		3	271	67
	6/22/05	7.75	5.2	329	101	1,859	6	20	5.0	6.2	29.6	0.85		18.3	31.3		2	312	66
	7/27/05	7.20	1.5	309	100	1,755	5	40	4.5	7.7	34.9	0.65		18.7	29.8		3	355	68
	8/23/05	7.40	3.4	298	97	1,728	1	30	7.0	8.5	35.3	0.60		14.3	27.4		3	1371	68
	9/21/05	7.42	4.0	263	93	2,389	2	30	7.0	5.4	31.0	0.80		19.8	27.7		1	1332	66
	10/26/05	7.75	6.4	294	93	1,458	2	30	8.0	7.1	14.4	0.65		16.5	29.0		1	729	55
	11/16/05	7.41	4.4	297	108	1,355	9	20	7.0	10.7	19.6	0.95		16.4	30.1		1	147	60
	12/28/05	7.96	9.6	291	91	1,373	10	20	6.5	6.8	16.1	1.10		15.8	30.7		2	137	57
	1/26/06	8.02	9.2	291	93	1,303	11	30	8.5	7.6	14.1	1.40		15.2	28.9		2	120	55
	2/22/06	7.74	8.5	289	95	1,197	7	30	4.5	7.6	8.6	2.00		13.7	29.6		3	183	48
	3/21/06	8.22	9.3	286	94	1,289	5	20	8.5	5.3	11.7	1.30		14.5	28.5		3	271	52
	4/19/06	8.17	7.4	290	102	1,170	4	20	6.0	4.2	11.3	1.80		16.3	31.7		4	313	52
	5/24/06	8.33	5.9	314	101	1,197	7	10	7.0	3.3	7.0	1.40		16.2	31.7		6	171	45
	6/22/06	7.91	5.7	277	98	1,121	7	10	6.0	2.8	8.0	1.45		18.2	31.6		3	151	47
	7/26/06	7.76	3.7	313	99	1,292	6	10	9.5	3.3	16.4	0.90		17.1			4	204	57
	8/29/06	8.42	6.0	310	100	1,521	7	10	12.0	5.1	30.7	0.65		15.7	32.7		9	226	66
	9/20/06	8.92	6.3	319	101	1,677	9	10	14.5	8.7	39.1	0.55		17.4	32.3		6	179	70
	10/18/06	8.67	7.5	321	103	1,804	6	20	13.5	7.5	40.3	0.55		16.9	33.1		3	312	70
	11/29/06	8.43	8.3	324	104	1,929	3	10	12.7	10.4	44.3	0.50		17.8	34.2		2	674	71
	12/20/06	7.63	5.1	330	107	1,924	4	20	13.5	10.6	41.5	0.60		18.6	34.8		2	437	70

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD - LYC	1/24/07	8.44	8.2	324	103	2,061	5	20	13.5	10.7	52.3	0.60		21.6	34.8		1	378	74
	2/21/07	8.40	8.8	322	104	2,049	4	20	10.0	11.5	44.3	0.60		19.0	33.3		1	532	71
	3/21/07	8.69	8.3	329	106	1,614	1	20	16.0	12.3	52.1	0.55		20.0	36.2		4	1153	74
	4/18/07	8.58	7.5	338	109	2,743	12	20	14.5	15.3	73.9	0.40		19.8	35.8		2	225	79
	5/23/07	8.70	7.0	358	114	3,204	8	30	15.5	18.6	103.5	0.35		27.5	37.8		3	403	84
	6/27/07	7.85	4.6	364	119	2,125	2	10	13.0	8.7	33.1	0.65		18.4	40.0		1	1017	67
	7/25/07	8.24	4.1	352	118	2,110	7	20	18.5	17.0	33.9	0.60		17.5	38.5		3	284	68
	8/22/07	8.31	5.0	370	120	1,914	6	10	18.0	15.3	32.1	0.60		19.8	40.7		3	340	67
	9/26/07	8.71	6.1	359	118	1,794	3	10	18.7	9.8	30.9	0.65		19.8	39.4		3	652	66
	10/17/07	8.64	6.0	360	118	1,968	6	10	17.8	8.0	32.3	0.65		21.1	38.5		7	332	67
	11/20/07	8.80	9.1	365	120	1,783	4	20	13.1	6.1	23.0	0.60		19.2	40.0		3	435	62
	12/19/07	8.72	9.4	366	118	1,616	5	10	26.1	6.1	19.9	0.65		20.3	39.2		4	305	60
	1/23/08	8.63	9.5	368	118	1,824	15	10	18.9	4.4	21.0	0.65		23.8	39.6		3	122	61
	2/26/08	8.80	9.9	366	119	1,826	13	10	29.0	5.4	20.9	0.60		19.9	39.4		3	140	61
	3/18/08	8.70	9.6	366	119	1,851	11	10	27.3	5.1	17.3	0.65		20.5	42.6		3	170	58
	4/23/08	8.91	9.5	368	126	1,838	8	10	33.3	4.5	13.0	0.70		21.9	41.9		3	245	54
	5/22/08	8.77	8.1	398	124	1,901	9	10	29.1	6.3	15.4	0.70		20.6	44.8		10	216	56
	8/27/08	7.87	5.8	312	95	2,227	7	60	11.0	11.1	56.3	0.55		24.1	36.9		5	309	75
	9/17/08	7.75	2.5	321	97	2,245	12	50	11.0	7.9	60.4	0.55		21.2	36.7		12	195	76
	10/30/08	8.31	7.8	339	105	2,471	20	20	13.0	12.8	80.6	0.40		28.1	36.0		13	125	80
	11/19/08	8.23	8.2	345	106	2,564	9	30	14.5	12.8	76.6	0.40		25.0	38.9		18	279	79
	12/16/08	7.70	6.5	343	107	2,533	6	30	15.0	14.4	60.8	0.50		23.6	36.2		11	452	76
	1/27/09	7.85	7.7	352	112	2,724	5	30	14.0	19.4	63.5	0.40		24.4	39.3		13	580	77
	2/23/09	8.25	8.8	358	115	2,852	13	30	11.0	20.6	55.0	0.55		25.0	38.1		13	213	75
	3/18/09	7.61	4.1	360	119	2,900	4	30	13.5	18.2	71.3	0.45		28.1	38.2		11	707	78
	4/23/09	8.16	6.2	384	123	3,101	25	30	10.0	18.3	81.4	0.40		28.5	38.9		17	124	80
	5/27/09	7.81	6.1	355	116	2,437	12	40	5.0	6.4	26.3	0.80		28.1	35.7		9	203	64
	6/17/09	7.99	4.7	360	117	2,228	11	100	5.5	10.6	34.6	0.65		24.8	35.7		6	203	68
	7/29/09	7.48	2.0	356	114	1,942	12	30	10.5	14.6	25.3	0.55		21.8	34.7		7	167	63
	8/20/09	7.40	2.4	341	111	1,913	9	20	9.0	13.0	24.0	0.85		19.3	38.0		10	225	63
	9/17/09	7.90	4.4	340	103	1,904	14	25	6.0	9.7	18.6	0.90		18.7	38.3		8	132	59
	10/14/09	7.80	4.6	347	114	1,649	4	20	7.4	6.1	15.4	0.75		19.0	37.0		4	423	56
	12/8/09	8.17	9.3	344	115	1,653	2	20	12.0	8.6	19.4	0.85		18.1	37.1		5	826	59
	1/12/10	8.21	10.9	348	119	1,697	11	10	6.0	4.8	10.1	1.10		20.5	35.8		14	151	50
	2/17/10	7.97	10.9	344	122	1,843	11	10	12.0	6.4	11.2	0.95		21.7	35.1		40	176	52
	4/8/10	7.85	4.7	334	110	1,489	7	20	6.2	4.2	14.2	1.15		18.9	35.0		47	201	55
	6/9/10	7.65	1.9	341	112	1,435	13	20	9.0	3.0	13.0	0.95		17.3	35.2		9	115	54
	8/12/10	8.14	7.1	342	110	1,465	7	10	9.5	4.9	21.3	0.80		18.7	36.1		9	206	61
	10/6/10	8.47	8.2	340	112	1,683	9	15	17.0	7.9	28.8	0.60		25.3	35.1		21	191	65
	12/15/10	8.50	10.4	363	115	1,913	5	13	12.0	9.2	26.8	0.55		18.3	33.1		8	416	64
	2/9/11	7.82	9.4	361	119	1,757	2	13	12.0	10.8	26.8	0.65		20.1	37.7		10	764	64
	3/30/11	8.62	7.8	373	122	1,892	7	12	8.5	9.0	37.0	0.50		19.8	38.2		10	259	69
	6/9/11	8.34	6.5	385	129	2,261	8	10	12.0	13.2	38.3	0.50		24.7	38.3		8	290	69
	9/1/11	7.77	3.2	395	135	2,115	9	11	10.0	10.6	39.0	0.65		19.1	43.1			227	70
	10/10/11	7.98	7.0	395	127	2,173	15	9	4.8	4.6	22.6	0.95		18.8	44.3		9	145	62
	12/6/11	8.29	9.4	416	131	2,306	11	8	6.4	5.8	21.3	0.91		18.4	46.0		4	210	61

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
SJRWMD - LYC	2/7/12	8.18	8.7	421	129	2,418	10	8	8.0	4.7	15.4	1.00		14.7	38.9		20	239	56
	4/10/12	8.60	9.5	438	142	2,459	9	8	6.6	8.8	12.4	0.97		19.2	48.9		11	286	53
	6/12/12	9.04	8.5	402	123	1,739	4	7	16.0	6.0	14.9	0.83		19.6	48.8		19	424	56
	8/16/12	9.17	8.9	377	108	1,721	4	8	13.0	8.2	22.0	0.83		16.5	49.0		18	465	61
	10/15/12	8.71	9.6	377	116	2,133	2	11	14.6	10.1	53.8	0.55		19.5	46.2		10	970	74
	12/11/12	8.70	10.6	419	133	1,807	2	7	10.6	7.4	23.8	0.65		17.8	51.0		5	821	62
	2/11/13	8.30	10.1	433	140	1,807	2	7	13.0	2.1	23.5	0.68		17.0	51.0		18	904	62
	4/22/13	8.43	8.1	456	146	1,790	6	7	10.6	6.7	24.1	0.77		19.8	52.7		17	298	63
	6/24/13	8.18	7.8	436	138	1,452	2	7	5.6	4.0	18.3	1.02		18.3	51.4		10	726	59
	8/21/13	8.65	6.6	411	126	1,610	5	8	11.6	4.6	22.7	0.69		18.2	50.8		21	335	62
	10/22/13	8.88	8.7	396	120	2,119	5	9	13.4	13.6	48.7	0.59		26.4	53.9		13	451	73
	12/10/13	8.90	10.4	415	122	2,333	2	8	18.0	10.8	47.2	0.50		22.5	53.3		10	1111	72
	2/24/14	8.57	9.9	413	126	2,426	3	9	16.8	15.1	43.6	0.45		22.7	51.8		11	971	71
	4/23/14	8.88	9.5	408	123	3,225	3	12	22.6	15.9	82.8	0.42		27.3	56.7		16	1112	80
	6/30/14	8.65	7.3	399	120	3,078	1	10	22.4	19.2	69.0	0.40		24.6	49.5		7	2798	78
	8/26/14	8.24	6.4	366	127	2,806	10	13	14.4	14.4	64.9	0.43		22.5	52.3		8	270	77
	10/27/14	7.52	7.1	410	133	2,310	10	21	7.8	6.9	27.3	0.67		14.0	52.0		6	231	64
	12/29/14	8.41	11.1	392	120	2,152	11	20	9.6	5.4	32.3	0.62		19.4	49.0		7	196	67
	2/26/15	7.70	8.8	401	129	2,876	56	26	8.4	5.2	11.9			18.1	47.3		40	51	52
	4/21/15	7.98	7.8	406	133	2,609	6	21	5.0	4.6	13.3	1.10		19.0	44.9		11	414	54
	6/24/15	8.82	7.0	408	131	1,815	8	14	12.0	8.4	20.9	0.59		23.8	47.4		9	233	61
SJRWMD - LYC Annual Geometric Mean Values	1985	8.29	8.7	312	124	1,823	25	15	8.4	3.1	15.4	1.4	2.5		30.5			57	56
	1986	8.52	8.9	306	117	984	12	11	5.3	4.0	11.7	1.3	3.0		28.2			77	52
	1987	7.50	8.9	317	113	892	10	16	3.8	2.5	3.3	1.4	1.7		30.2			64	33
	1988	8.35	8.6	304	106		8	22	3.2	1.6	4.7	2.3	1.3	10.5	31.1				39
	1999	8.20	8.4	317	57	960	11	6	4.9	2.8	8.0	2.1	1.6		33.7			46	46
	2000	7.89	1.5	351	122	2,009	6	14	9.4	11.4	34.4	0.6		17.3	38.6		21	340	68
	2001	7.77	1.9	368	120	1,838	9	15	9.2	8.4	23.2	0.7		17.0	42.3		21	203	61
	2002	7.16	1.1	370	120	2,425	5	21	11.1	11.1	34.4	0.6		21.0	40.0		8	468	67
	2003	8.12	4.6	330	116	1,894	6	24	9.5	5.9	21.3	0.8		19.3	36.4		11	304	60
	2004	7.96	6.7	302	110	1,811	5	23	7.1	6.0	28.9	0.8		19.1	34.6		7	333	65
	2005	7.83	5.4	307	98	1,828		28	6.6	8.5	29.7	0.7		18.7	30.9		2	420	65
	2006	8.18	6.7	305	100	1,424	6	15	9.1	5.8	18.2	1.0		16.4	31.7		3	240	58
	2007	8.50	6.8	350	114	2,041	5	15	15.8	10.9	39.7	0.6		20.2	37.8		3	444	69
	2008	8.36	7.3	352	111	2,107	10	19	18.6	7.7	33.8	0.6		22.7	39.2		7	207	67
	2009	7.85	5.0	354	114	2,245		30	8.9	12.2	33.6	0.6		22.9	37.3		9	278	67
	2010	8.11	6.8	344	114	1,637	8	13	9.6	5.4	16.6	0.8		19.9	35.0		17	193	57
	2011	8.13	6.8	387	127	2,074	8	10	8.5	8.4	29.9	0.7		20.0	41.1		8	271	66
	2012	8.73	9.3	405	125	2,023	4	8	10.9	7.3	20.8	0.8		17.8	47.0		13	470	60
	2013	8.55	8.5	424	132	1,829	3	7	11.4	5.8	28.5	0.7		20.1	52.2		14	566	65
	2014	8.37	8.4	398	125	2,637		13	14.5	11.6	49.2	0.5		21.3	51.8		9	577	73
	2015	8.15	7.8	405	131	2,388	14	20	8.0	5.9	14.9	0.8		20.2	46.5		16	170	56

Historical Water Quality Characteristics in Lake Yale from 1985 - 2015 (SJRWMD)

Indicates data excluded from analyses

Station Name	Date	pH (s.u.)	Diss. O_2 (mg/L)	Cond. (µmho/cm)	Alkalinity (mg/L)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)	TSS (mg/L)	Turbidity (NTU)	Chyl-a (mg/m^3)	Secchi (m)	BOD (mg/L)	TOC (mg/L)	Chloride (mg/L)	Fecal Coliform	Total Al (µg/L)	TN/TP Ratio	TSI (Chyl-a)
STORET L YALE SE END	3/28/06	8.30	8.9	305				20				1.40							
	6/14/06	8.30	7.2	334								0.80	0.0				16		
	8/15/06	8.70	7.1	314		1,004		15			35.1	0.80	0.0						
	10/17/06	8.70	7.9	334		1,204		20			38.5	0.50	4.0						
STORET SJD-LL-1006 UNKNOWN	4/8/02		8.1	210															
	1/13/03	5.06	9.0	120	1	910	49				3.2	0.60							
	4/7/03	5.60	6.7	140	1	1,090	25				1.9								
	7/23/03	6.00	6.4	122	5		26				2.0	1.40							
	10/20/03	6.60	7.2	144	14	330	26				3.0	1.50							
	1/20/04	6.80	5.6	137	11							1.10							
	4/5/04	6.22	6.6	127	6	430	29				0.9	1.40							
	7/19/04	7.21	7.1	167	30						3.0	0.90							
	10/5/04	5.73		54	4	160	160				6.2	0.30							
	1/10/05	6.50			7	930	25				9.1	0.70							
	4/11/05	5.50	7.1	109	5	960	39				4.0	0.90							
	7/11/05	5.70	6.5	85	0	600	15				3.9	0.60							
	1/9/06	5.38	10.0	99	1	450	18				2.1	0.80							
	4/10/06	5.53	10.8	107	1	610	33				1.0	1.00							
	7/10/06	7.30	5.4	134	18	440	22				3.9	1.10							
	10/23/06	6.98	6.5	127	8		13				1.4	1.80							
	1/8/07	6.29	9.3	116	3		15				3.1	1.00							
	4/2/07	6.37	7.9	154	4		16				1.2	1.90							
	7/9/07	6.89	9.0	183	28		18				1.9	1.80							
	10/15/07	7.14	6.1	195	31	670	12				2.3	0.90							
	1/14/08	5.91	11.4	146	1		23				1.4	1.30							
	4/7/08	6.10	8.2	146	2		10				1.3	1.30							
STORET SJD-LL-1028 UNKNOWN	1/13/03	6.10	6.6	74	10	1,610	23					0.40							
	5/5/03	6.10	3.2	114	13	2,310	111				1.3	0.40							
	7/23/03	5.60	5.2	129	20		110				0.7	0.70							
	10/20/03	6.40	5.1	103			164					0.30							
	1/20/04	6.20	8.1	117		1,470	115					0.50							
	4/5/04		7.6	113			111					0.40							
	7/19/04		8.6	1			29					0.70							
	10/5/04			97			222					0.30							
	1/10/05	6.30			18	1,500	65				1.1	0.50							
	4/11/05	6.60	6.2	109	39		68				4.8	0.60							
	7/11/05	6.70	5.2	103	20		225				13.5	0.50							
	1/9/06	6.44	9.8	127	2		120				2.6	0.50							
	4/10/06	6.95	8.4	142	24		98				10.4	0.20							
	7/10/06	7.30	6.2	159	26		70				18.3	0.50							
	10/23/06	7.00	6.0	212								0.25							
	1/8/07	6.50	8.9	220	29	2,580	73				5.0	0.30							
	4/2/07	6.70	7.7	246	36		80				8.2	0.20							
	7/9/07	7.40	9.7	265	46		77				9.3	0.40							
	10/15/07	6.88	5.0	150	29	3,260	201					0.30							
	1/14/08	6.50	10.6	171	34	2,620	153				1.2	0.25							
	4/7/08	6.50	7.0	156	26	2,360	103				5.6	0.40							

APPENDIX D

RESULTS OF SURFACE WATER MONITORING CONDUCTED IN TROUT LAKE FROM MARCH 2015 – MARCH 2016

D.1 Vertical Field Profiles
D.2 Lab Measurements

D.1 Vertical Field Profiles

Field Measurements Collected in Lake Trout from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 1	3/26/15	10:49	0.25	24.50	7.23	129	4.8	58	443	0.31
		10:49	0.50	24.48	7.09	129	4.9	58	438	
		10:50	1.00	24.47	7.00	129	4.7	56	437	
		10:50	1.50	24.14	6.93	129	4.5	54	436	
		10:51	2.00	23.53	6.77	128	3.0	35	432	
		10:52	2.50	22.87	6.62	129	1.4	17	429	
		10:53	2.94	22.23	6.53	142	0.7	8	425	
Site 1	4/30/15	12:40	0.25	25.25	8.21	152	8.7	106	455	0.31
		12:40	0.50	25.26	8.12	152	8.5	104	453	
		12:41	1.00	25.25	8.07	152	8.4	102	449	
		12:42	1.50	25.21	8.01	152	8.2	100	445	
		12:42	2.00	25.22	7.95	152	8.3	101	439	
		12:43	2.50	25.12	7.88	152	8.2	99	434	
		12:45	2.74	24.76	6.80	261	0.4	5	267	
Site 1	5/28/15	10:48	0.25	29.61	7.72	175	4.7	62	455	0.82
		10:49	0.50	29.41	7.54	176	4.3	57	453	
		10:50	1.00	28.80	7.38	176	3.6	47	447	
		10:51	1.50	28.58	7.29	176	3.6	46	447	
		10:53	2.00	28.54	7.19	180	3.2	42	445	
		10:54	2.49	28.57	7.08	179	1.9	24	433	
Site 1	6/18/15	10:38	0.25	31.01	7.46	200	6.0	81	463	0.69
		10:38	0.50	30.25	7.38	199	4.5	60	462	
		10:40	1.00	30.05	7.31	199	4.1	54	461	
		10:40	1.50	29.79	7.24	200	3.4	44	457	
		10:41	2.00	29.43	7.14	197	1.8	23	452	
		10:42	2.50	28.31	6.95	203	0.3	4	389	
		10:43	2.87	28.13	6.86	223	0.2	3	291	
Site 1	7/29/15	8:51	0.25	29.65	7.48	205	5.0	66	486	0.85
		8:51	0.50	29.54	7.41	205	4.5	59	482	
		8:52	1.00	29.40	7.36	205	4.1	54	481	
		8:53	1.50	29.32	7.32	205	4.0	52	481	
		8:53	2.00	29.18	7.27	205	3.5	46	479	
		8:54	2.50	29.16	7.23	206	3.3	43	477	
		8:55	2.84	29.21	6.63	451	0.5	6	391	
Site 1	8/27/15	6:46	0.25	30.17	8.12	191	6.0	79	449	0.72
		6:47	0.50	30.23	8.00	190	5.9	78	448	
		6:47	1.00	30.27	7.93	190	5.7	75	447	
		6:48	1.50	30.28	7.91	190	5.6	74	447	
		6:49	2.00	30.27	7.87	191	5.6	75	445	
		6:50	2.50	30.20	7.66	190	4.1	55	444	
		6:51	2.95	29.81	6.99	237	0.3	3	288	
Site 1	9/22/15	11:15	0.25	27.77	7.09	142	4.1	52	484	0.49
		11:16	0.50	27.78	7.02	142	4.0	51	483	
		11:16	1.00	27.78	6.97	142	3.7	48	481	
		11:17	1.50	27.68	6.92	142	3.2	41	480	
		11:18	2.00	27.66	6.85	143	2.9	37	475	
		11:19	2.50	26.90	6.71	154	0.4	5	401	
		11:20	2.88	26.88	6.47	302	0.4	4	258	

Field Measurements Collected in Lake Trout from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 1	10/28/15	10:28	0.25	24.35	7.78	164	5.4	65	488	0.56
		10:29	0.50	24.36	7.67	164	5.0	59	482	
		10:30	1.00	24.36	7.52	163	4.9	58	473	
		10:30	1.50	24.36	7.48	161	4.8	57	471	
		10:31	2.50	24.33	7.39	162	4.7	56	466	
		10:32	2.00	24.35	7.41	165	4.7	56	465	
		10:32	3.00	24.32	7.22	162	3.7	44	443	
		10:33	3.40	24.42	7.21	188	3.4	41	273	
Site 1	11/23/15	9:27	0.25	22.06	7.01	165	5.9	67	503	0.51
		9:28	0.50	22.07	6.89	166	5.2	60	499	
		9:29	1.00	22.08	6.80	166	5.2	59	494	
		9:30	1.50	22.02	6.76	165	5.0	57	493	
		9:31	2.00	22.03	6.72	165	4.9	56	491	
		9:32	2.50	22.02	6.68	165	4.7	53	489	
		9:33	2.60	22.08	6.67	166	4.1	47	453	
Site 1	12/15/15	13:48	0.25	22.50	7.52	170	5.8	66	324	0.55
		13:48	0.50	22.23	7.38	171	5.5	63	316	
		13:49	1.00	22.05	7.32	172	5.0	58	312	
		13:50	1.50	21.47	7.22	171	4.9	56	306	
		13:51	2.00	21.20	7.14	172	4.3	48	300	
		13:52	2.50	20.92	7.03	172	3.4	38	294	
		13:53	2.73	20.83	6.91	172	2.4	27	285	
Site 1	2/3/16	13:23	0.25	19.93	7.35	148	8.1	89	290	0.60
		13:24	0.50	19.86	7.14	149	7.5	82	289	
		13:25	1.00	19.77	7.10	148	7.3	80	285	
		13:26	1.50	19.60	7.08	148	7.2	79	280	
		13:26	2.00	15.17	7.01	149	6.2	61	278	
		13:27	2.50	14.58	6.91	151	5.1	50	274	
		13:29	2.91	15.26	6.54	364	0.4	4	266	
Site 1	3/10/16	8:20	0.25	20.10	7.19	146	8.5	93	330	0.38
		8:20	0.50	20.07	7.17	146	8.2	90	327	
		8:21	1.00	20.07	7.13	146	8.0	89	327	
		8:21	1.50	20.04	7.12	146	7.9	87	325	
		8:22	2.00	19.86	6.98	147	7.1	78	325	
		8:23	2.50	19.64	6.83	147	5.7	62	324	
		8:24	2.95	19.30	6.36	290	0.6	6	324	
Trout Lake - Site 1 Geometric Mean Values by Depth			**0.25**	**25.29**	**7.50**	**164**	**5.9**	**72**	**424**	**0.54**
			0.50	**25.18**	**7.39**	**164**	**5.5**	**67**	**421**	
			1.00	**25.09**	**7.32**	**164**	**5.2**	**63**	**418**	
			1.50	**24.93**	**7.26**	**164**	**4.9**	**60**	**415**	
			2.00	**24.27**	**7.18**	**164**	**4.2**	**51**	**412**	
			2.50	**23.94**	**7.07**	**166**	**2.5**	**30**	**398**	
			3.00	**23.48**	**6.72**	**237**	**0.7**	**8**	**328**	

Field Measurements Collected in Lake Trout from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 2	3/26/15	11:13	0.25	24.12	6.71	129	4.4	53	413	0.33
		11:13	0.50	23.99	6.63	129	4.0	48	413	
		11:14	1.00	23.78	6.59	129	3.5	42	412	
		11:15	1.50	23.35	6.49	128	2.4	29	410	
		11:16	2.00	23.26	6.43	129	2.1	24	410	
		11:16	2.50	22.12	6.37	132	0.5	6	408	
		11:17	2.75	21.78	6.33	217	0.3	3	405	
Site 2	4/30/15	12:52	0.25	25.08	7.25	151	7.2	88	444	0.32
		12:53	0.50	25.09	7.27	150	7.1	86	440	
		12:53	1.00	24.97	7.27	150	7.0	85	435	
		12:54	1.50	24.97	7.28	151	6.9	84	425	
		12:54	2.00	24.88	7.28	151	6.9	84	403	
		12:56	2.50	24.38	6.69	194	0.3	3	353	
		12:57	2.55	24.43	6.63	295	0.2	3	265	
Site 2	5/28/15	11:01	0.25	29.37	7.26	175	5.1	66	428	0.84
		11:01	0.50	29.39	7.25	175	5.0	65	427	
		11:02	1.00	29.29	7.24	176	4.7	62	427	
		11:03	1.50	29.13	7.23	176	4.5	59	426	
		11:03	2.00	29.07	7.21	177	4.4	57	425	
		11:04	2.50	28.81	6.72	292	0.3	4	379	
		11:05	2.74	28.74	6.65	291	0.3	3	323	
Site 2	6/18/15	10:22	0.25	31.34	7.98	200	7.0	95	479	0.68
		10:22	0.50	31.29	7.94	200	6.9	94	478	
		10:23	1.00	31.07	7.85	201	6.4	86	478	
		10:24	1.50	30.53	7.70	200	5.0	67	476	
		10:25	2.00	30.19	7.50	200	3.7	50	472	
		10:26	2.50	28.90	6.99	263	0.5	7	430	
		10:27	2.58	28.54	6.71	312	0.3	4	203	
Site 2	7/29/15	8:59	0.25	29.54	7.25	206	4.6	61	385	0.84
		9:00	0.50	29.26	7.24	207	4.0	52	385	
		9:01	1.00	29.12	7.22	206	3.6	47	384	
		9:02	1.50	29.03	7.19	205	3.3	43	383	
		9:02	2.00	28.97	7.14	204	3.1	40	379	
		9:03	2.50	29.00	6.98	215	1.1	15	362	
		9:04	2.63	29.02	6.84	228	0.3	4	295	
Site 2	8/27/15	6:56	0.25	30.25	7.53	189	5.0	66	379	0.63
		6:56	0.50	30.25	7.53	189	4.9	66	376	
		6:57	1.00	30.24	7.53	190	4.8	64	370	
		6:58	1.50	30.24	7.50	189	4.5	59	368	
		6:59	2.00	30.08	7.33	187	2.4	32	363	
		7:00	2.50	29.54	7.10	197	0.2	3	304	
		7:02	2.70	29.40	6.75	298	0.2	2	146	
Site 2	9/22/15	11:27	0.25	28.18	6.99	144	5.3	68	407	0.49
		11:27	0.50	28.14	7.00	144	5.1	64	403	
		11:28	1.00	28.12	6.98	143	5.0	64	399	
		11:29	1.50	27.90	6.97	144	4.6	59	394	
		11:30	2.00	27.69	6.89	143	3.4	43	383	
		11:30	2.50	26.93	6.70	158	0.3	4	340	
		11:32	2.81	26.87	6.46	343	0.2	3	130	

Field Measurements Collected in Lake Trout from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 2	10/28/15	10:35	0.25	24.36	7.02	165	4.8	58	425	0.56
		10:36	0.50	24.36	7.05	165	4.7	56	425	
		10:37	1.00	24.36	7.05	165	4.5	54	423	
		10:38	1.50	24.32	7.03	166	4.4	52	423	
		10:39	2.00	24.31	7.03	165	4.2	51	422	
		10:40	2.50	24.27	6.96	167	3.5	42	416	
		10:41	3.00	24.24	6.96	169	3.5	41	311	
Site 2	11/23/15	9:40	0.25	21.81	6.66	163	5.6	63	451	0.59
		9:41	0.50	21.88	6.65	164	5.4	61	450	
		9:42	1.00	21.89	6.65	165	5.2	59	450	
		9:43	1.50	21.87	6.63	165	5.2	59	450	
		9:44	2.00	21.88	6.62	164	5.1	58	450	
		9:45	2.50	21.88	6.61	166	4.9	56	450	
		9:46	2.60	21.96	6.59	174	0.6	7	391	
Site 2	12/15/15	13:56	0.25	22.28	6.91	168	5.6	65	284	0.55
		13:57	0.50	22.13	6.89	167	5.5	63	283	
		13:58	1.00	21.96	6.87	169	5.4	62	280	
		13:58	1.50	21.67	6.85	169	5.0	56	279	
		13:59	2.00	21.44	6.81	169	4.4	50	274	
		14:00	2.50	21.11	6.76	171	3.6	40	271	
		14:01	2.64	21.10	6.72	172	3.0	34	268	
Site 2	2/3/16	13:35	0.25	19.77	6.99	148	7.2	79	227	0.60
		13:36	0.50	19.00	6.93	148	6.2	67	224	
		13:37	1.00	18.13	6.88	148	6.0	63	224	
		13:37	1.50	15.56	6.87	147	5.7	57	219	
		13:38	2.00	14.65	6.87	151	5.2	51	212	
		13:39	2.50	14.63	6.83	154	1.5	15	206	
		13:40	2.83	14.87	6.71	238	0.4	4	194	
Site 2	3/10/16	8:29	0.25	20.31	7.05	146	8.1	89	230	0.37
		8:30	0.50	20.21	7.00	146	7.8	86	230	
		8:30	1.00	20.15	7.01	146	7.4	82	229	
		8:31	1.50	20.11	7.01	146	7.6	83	225	
		8:32	2.00	19.67	6.80	145	6.1	66	222	
		8:33	2.50	19.19	6.66	147	4.6	49	222	
		8:33	2.69	18.98	6.56	344	3.2	34	220	
Trout Lake - Site 2 Geometric Mean Values by Depth			**0.25**	**25.23**	**7.13**	**164**	**5.7**	**70**	**369**	**0.54**
			0.50	**25.10**	**7.11**	**164**	**5.4**	**66**	**367**	
			1.00	**24.92**	**7.09**	**164**	**5.2**	**63**	**365**	
			1.50	**24.46**	**7.05**	**164**	**4.7**	**57**	**362**	
			2.00	**24.20**	**6.99**	**164**	**4.0**	**48**	**357**	
			2.50	**23.77**	**6.78**	**183**	**1.0**	**12**	**335**	
			3.00	**23.72**	**6.66**	**249**	**0.5**	**6**	**248**	

D.2 Lab Measurements

Characteristics of Surface Water Samples Collected in Trout Lake from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-634	Site #1	Surface	3/26/15	25.2	177	467	673	300	1,617	254	83	56	393	1.4	325	2.8	5.9	4	42
15-864	Site #1	Surface	4/30/15	39.2	20	15	853	373	1,261	141	83	72	297	6.3	252	5.8	63.1	4	76
15-1050	Site #1	Surface	5/28/15	43.6	229	29	679	276	1,213	183	40	32	255	2.5	217	5.2	16.8	5	57
15-1175	Site #1	Surface	6/18/15	55.4	5	7	592	248	852	223	41	89	353	3.4	171	2.2	23.6	2	62
15-1474	Site #1	Surface	7/29/15	58.8	44	3	1,152	464	1,663	165	21	82	267	3.2	114	7.4	31.6	6	67
15-1742	Site #1	Surface	8/27/15	57.4	85	3	1,353	538	1,979	72	34	93	200	8.7	130	8.2	63.3	10	77
15-2027	Site #1	Surface	9/23/15	42.8	77	3	904	554	1,538	90	11	71	173	2.8	133	2.0	37.7	9	69
15-2343	Site #1	Surface	10/28/15	40.4	497	73	824	386	1,780	121	74	25	221	2.0	232	2.2	3.8	8	36
15-2557	Site #1	Surface	11/23/15	35.8	19	653	939	481	2,092	213	34	16	263	1.4	285	2.2	2.8	8	32
15-2856	Site #1	Surface	12/15/15	34.8	29	709	999	620	2,358	199	89	111	399	1.4	281	1.6	4.9	6	40
16-386	Site #1	Surface	2/3/16	33.0	137	618	771	685	2,211	173	71	79	323	1.8	244	1.8	5.3	7	41
16-708	Site #1	Surface	3/10/16	40.0	37	181	814	450	1,482	162	28	21	211	5.7	212	9.9	9.6	7	49
Minimum Value:				**25.2**	**5**	**3**	**592**	**248**	**852**	**72**	**11**	**16**	**173**	**1.4**	**114**	**1.6**	**2.8**	**2.4**	**32**
Maximum Value:				**58.8**	**497**	**709**	**1,353**	**685**	**2,358**	**254**	**89**	**111**	**399**	**8.7**	**325**	**9.9**	**63.3**	**9.9**	**77**
Arithmetic Value:				**42.2**	**113**	**230**	**879**	**448**	**1,671**	**166**	**51**	**62**	**280**	**3.4**	**216**	**4.3**	**22.4**	**6.4**	**54**
Geometric Mean:				**41.1**	**59**	**48**	**857**	**428**	**1,612**	**157**	**43**	**53**	**270**	**2.8**	**206**	**3.5**	**13.3**	**6.0**	**52**

15-635	Site #1	Bottom	3/26/15	23.2	174	45	632	668	1,519	288	40	52	380	1.2	328	2.0	-	-	-
15-865	Site #1	Bottom	4/30/15	35.6	22	8	675	650	1,355	185	37	77	299	6.5	292	11.2	-	-	-
15-1051	Site #1	Bottom	5/28/15	31.2	270	22	624	620	1,535	204	48	39	292	3.0	247	4.2	-	-	-
15-1176	Site #1	Bottom	6/18/15	54.4	129	3	603	249	984	344	33	62	439	6.0	185	9.2	-	-	-
15-1475	Site #1	Bottom	7/29/15	61.6	105	6	1,097	507	1,715	148	40	89	278	4.2	111	5.4	-	-	-
15-1743	Site #1	Bottom	8/27/15	56.4	91	3	1,388	481	1,964	100	27	103	230	7.1	126	9.0	-	-	-
15-2028	Site #1	Bottom	9/23/15	42.2	182	3	963	416	1,564	121	83	76	280	2.3	140	1.8	-	-	-
15-2344	Site #1	Bottom	10/28/15	37.8	605	98	779	335	1,817	177	25	35	237	1.1	293	1.3	-	-	-
15-2558	Site #1	Bottom	11/23/15	32.8	29	634	1,097	620	2,380	215	56	33	304	6.3	289	15.1	-	-	-
15-2857	Site #1	Bottom	12/15/15	32.6	36	719	1,174	1,095	3,024	181	106	108	395	1.4	281	1.7	-	-	-
16-387	Site #1	Bottom	2/3/16	32.4	130	664	687	581	2,062	178	15	32	225	1.9	252	2.7	-	-	-
16-709	Site #1	Bottom	3/10/16	35.6	83	181	841	438	1,543	171	21	23	215	2.5	219	4.3	-	-	-
Minimum Value:				**23.2**	**22**	**3**	**603**	**249**	**984**	**100**	**15**	**23**	**215**	**1.1**	**111**	**1.3**	-	-	-
Maximum Value:				**61.6**	**605**	**719**	**1,388**	**1,095**	**3,024**	**344**	**106**	**108**	**439**	**7.1**	**328**	**15.1**	-	-	-
Arithmetic Value:				**39.7**	**155**	**199**	**880**	**555**	**1,788**	**193**	**44**	**61**	**298**	**3.6**	**230**	**5.7**	-	-	-
Geometric Mean:				**38.2**	**104**	**38**	**847**	**520**	**1,722**	**183**	**38**	**54**	**290**	**3.0**	**218**	**4.2**	-	-	-

Characteristics of Surface Water Samples Collected in Trout Lake from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-637	Site #2	Surface	3/26/15	24.4	191	61	589	242	1,083	283	22	62	367	1.9	321	2.0	6.0	3	43
15-867	Site #2	Surface	4/30/15	35.0	15	3	636	226	880	178	59	62	299	4.7	288	6.4	45.5	3	72
15-1053	Site #2	Surface	5/28/15	43.2	240	17	642	228	1,127	219	31	36	286	3.6	250	1.4	18.1	4	59
15-1178	Site #2	Surface	6/18/15	55.4	3	3	630	297	933	209	16	184	409	6.8	175	6.8	34.9	2	68
15-1477	Site #2	Surface	7/29/15	61.2	70	3	1,157	357	1,587	168	14	121	303	3.3	114	5.6	26.3	5	64
15-1745	Site #2	Surface	8/27/15	49.2	82	3	1,380	417	1,882	102	25	146	272	14.3	133	9.8	57.2	7	75
15-2030	Site #2	Surface	9/23/15	42.6	3	3	1,196	332	1,534	89	16	69	174	2.7	236	4.2	26.8	9	64
15-2346	Site #2	Surface	10/28/15	40.0	699	105	614	303	1,721	180	22	29	231	1.6	289	2.7	2.4	7	29
15-2560	Site #2	Surface	11/23/15	31.8	22	647	1,084	542	2,296	217	37	28	282	1.7	296	2.9	2.7	8	31
15-2859	Site #2	Surface	12/15/15	31.0	37	720	1,193	590	2,540	181	44	68	293	1.2	300	1.3	3.9	9	36
16-389	Site #2	Surface	2/3/16	31.8	136	647	635	517	1,935	188	17	29	234	2.5	263	4.2	3.5	8	35
16-711	Site #2	Surface	3/10/16	39.8	49	185	612	540	1,386	168	19	90	277	5.9	219	3.8	15.2	5	56
Minimum Value:				**24.4**	**3**	**3**	**589**	**226**	**880**	**89**	**14**	**28**	**174**	**1.2**	**114**	**1.3**	**2.4**	**2.3**	**29**
Maximum Value:				**61.2**	**699**	**720**	**1,380**	**590**	**2,540**	**283**	**59**	**184**	**409**	**14.3**	**321**	**9.8**	**57.2**	**8.8**	**75**
Arithmetic Value:				**40.5**	**129**	**200**	**864**	**383**	**1,575**	**182**	**27**	**77**	**286**	**4.2**	**240**	**4.3**	**20.2**	**5.9**	**53**
Geometric Mean:				**39.2**	**48**	**33**	**818**	**361**	**1,494**	**174**	**24**	**64**	**280**	**3.2**	**230**	**3.6**	**12.0**	**5.3**	**50**

15-638	Site #2	Bottom	3/26/15	23.2	207	418	223	347	1,194	326	11	48	385	1.5	328	3.0	-	-	-
15-868	Site #2	Bottom	4/30/15	35.2	20	13	491	305	829	188	44	70	301	4.5	299	7.2	-	-	-
15-1054	Site #2	Bottom	5/28/15	44.2	395	18	581	344	1,338	224	24	56	304	2.7	254	3.0	-	-	-
15-1179	Site #2	Bottom	6/18/15	54.8	5	19	475	379	878	220	24	150	394	3.5	175	7.4	-	-	-
15-1478	Site #2	Bottom	7/29/15	60.6	113	8	1,173	339	1,634	182	26	77	285	3.4	118	4.8	-	-	-
15-1746	Site #2	Bottom	8/27/15	43.8	131	3	1,195	585	1,915	129	21	149	298	5.7	144	7.2	-	-	-
15-2031	Site #2	Bottom	9/23/15	42.8	364	3	662	465	1,494	141	42	75	258	2.3	240	2.6	-	-	-
15-2347	Site #2	Bottom	10/28/15	39.2	849	111	403	330	1,693	181	30	24	234	1.6	293	1.9	-	-	-
15-2561	Site #2	Bottom	11/23/15	32.6	22	644	810	684	2,160	217	32	25	275	3.3	292	7.3	-	-	-
15-2860	Site #2	Bottom	12/15/15	31.6	97	729	1,076	714	2,616	191	27	100	318	1.3	289	1.9	-	-	-
16-390	Site #2	Bottom	2/3/16	31.4	133	705	503	651	1,992	188	12	29	229	1.9	266	3.3	-	-	-
16-712	Site #2	Bottom	3/10/16	36.0	149	163	510	575	1,398	199	16	36	251	4.9	219	9.0	-	-	-
Minimum Value:				**23.2**	**5**	**3**	**223**	**305**	**829**	**129**	**11**	**24**	**229**	**1.3**	**118**	**1.9**	-	-	-
Maximum Value:				**60.6**	**849**	**729**	**1,195**	**714**	**2,616**	**326**	**44**	**150**	**394**	**5.7**	**328**	**9.0**	-	-	-
Arithmetic Value:				**39.6**	**207**	**236**	**675**	**477**	**1,595**	**199**	**26**	**70**	**294**	**3.1**	**243**	**4.9**	-	-	-
Geometric Mean:				**38.4**	**104**	**55**	**607**	**454**	**1,514**	**194**	**24**	**58**	**290**	**2.7**	**233**	**4.2**	-	-	-

APPENDIX E

RESULTS OF SURFACE WATER MONITORING CONDUCTED IN LAKE YALE FROM MARCH 2015 – MARCH 2016

E.1 Vertical Field Profiles
E.2 Lab Measurements

E.1 Vertical Field Profiles

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 1	3/26/15	7:47	0.25	24.10	7.80	407	6.1	73	463	1.56
		7:47	0.50	24.09	7.80	407	6.1	72	463	
		7:48	1.00	24.10	7.79	407	6.0	71	463	
		7:49	1.50	24.10	7.79	407	5.8	70	463	
		7:50	2.00	24.10	7.79	406	5.7	68	464	
		7:50	2.50	24.10	7.79	407	5.7	66	464	
		7:51	3.00	24.03	7.76	407	5.4	64	463	
		7:52	3.50	23.75	7.46	416	0.6	7	445	
		7:53	3.86	23.63	7.40	420	0.7	9	234	
Site 1	4/30/15	10:43	0.25	25.13	8.51	405	8.2	100	459	0.69
		10:44	0.50	25.14	8.51	404	8.1	98	460	
		10:44	1.00	25.13	8.52	405	7.8	95	461	
		10:45	1.50	25.11	8.52	404	7.8	95	461	
		10:45	2.00	25.09	8.52	405	7.9	95	461	
		10:46	2.50	25.11	8.52	405	7.7	94	462	
		10:46	3.00	25.06	8.52	405	7.7	94	462	
		10:48	3.50	24.98	7.73	428	0.6	7	329	
		10:49	3.78	24.97	7.57	427	0.3	4	222	
Site 1	5/28/15	8:45	0.25	28.04	8.97	407	8.4	108	463	0.56
		8:46	0.50	28.04	8.97	407	8.2	105	466	
		8:47	1.00	28.05	8.97	407	7.9	101	468	
		8:48	1.50	28.05	8.97	407	7.9	101	469	
		8:48	2.00	28.05	8.97	407	7.8	100	470	
		8:49	2.50	28.05	8.97	406	7.9	101	472	
		8:50	3.00	28.05	8.98	407	7.9	101	474	
		8:51	3.50	27.92	7.76	438	1.6	21	429	
		8:52	3.73	27.72	7.33	445	1.1	15	414	
Site 1	6/18/15	8:32	0.25	31.49	9.04	402	8.1	110	490	0.62
		8:33	0.50	31.47	9.07	403	8.1	111	497	
		8:33	1.00	31.35	9.08	402	8.0	108	503	
		8:34	1.50	31.30	9.08	402	7.5	101	506	
		8:35	2.00	31.22	9.08	398	7.4	98	509	
		8:35	2.50	30.21	9.06	402	7.1	95	511	
		8:36	3.00	29.84	9.03	403	7.1	94	513	
		8:37	3.50	29.37	7.82	472	0.8	10	349	
		8:39	3.61	29.34	7.52	477	0.2	3	235	
Site 1	7/29/15	8:00	0.25	29.01	8.67	383	6.4	83	501	0.64
		8:01	0.50	29.00	8.69	383	6.4	83	501	
		8:02	1.00	28.95	8.70	382	6.3	82	501	
		8:02	1.50	28.92	8.70	383	6.1	80	504	
		8:03	2.00	28.91	8.71	383	6.5	84	505	
		8:04	2.50	28.89	8.71	383	6.1	80	505	
		8:04	3.00	28.89	8.71	383	6.1	80	507	
		8:06	3.50	28.91	7.12	392	1.0	12	425	
		8:07	3.77	28.98	7.00	453	0.6	8	314	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 1	8/27/15	10:56	0.25	31.11	8.88	391	6.2	84	422	0.65
		10:57	0.50	31.11	8.93	391	6.3	85	429	
		10:57	1.00	31.10	8.95	391	6.3	85	435	
		10:58	1.50	31.09	8.95	391	6.3	85	439	
		10:58	2.00	30.91	8.92	391	5.9	79	442	
		10:59	2.50	30.73	8.89	391	5.6	76	445	
		11:00	3.00	30.43	8.85	391	5.4	72	446	
		11:00	3.50	30.01	8.06	445	3.3	43	406	
		11:01	3.92	29.78	7.30	510	0.5	6	263	
Site 1	9/22/15	8:22	0.25	28.05	8.62	376	7.0	89	545	0.64
		8:23	0.50	28.09	8.66	375	6.8	87	545	
		8:24	1.00	28.09	8.67	376	6.8	87	546	
		8:24	1.50	28.10	8.68	376	6.8	87	545	
		8:25	2.00	28.09	8.68	376	6.6	85	545	
		8:25	2.50	28.09	8.68	376	6.6	84	545	
		8:26	3.00	28.10	8.68	376	6.7	86	545	
		8:26	3.50	28.09	8.67	376	6.6	84	545	
		8:28	4.00	27.94	7.18	441	0.4	5	265	
Site 1	10/28/15	8:42	0.25	24.24	8.55	420	7.3	87	483	0.71
		8:43	0.50	24.24	8.49	420	7.0	83	479	
		8:43	1.00	24.24	8.47	419	6.8	81	477	
		8:44	1.50	24.24	8.46	418	6.8	81	478	
		8:45	2.00	24.24	8.45	419	6.8	81	476	
		8:45	2.50	24.24	8.45	418	6.8	81	476	
		8:46	3.00	24.24	8.44	419	6.7	80	476	
		8:47	3.50	24.24	8.44	418	6.7	80	476	
		8:48	4.00	24.56	7.84	432	6.4	77	456	
Site 1	11/23/15	11:58	0.25	22.44	8.04	413	8.5	98	527	0.73
		11:59	0.50	22.44	8.11	413	8.3	95	529	
		12:00	1.00	22.42	8.14	413	8.1	94	530	
		12:01	1.50	22.43	8.16	414	8.2	94	530	
		12:02	2.00	22.41	8.17	414	8.1	93	531	
		12:03	2.50	22.39	8.19	415	8.1	93	531	
		12:04	3.00	22.35	8.18	415	7.8	90	531	
		12:04	3.50	22.35	8.17	414	7.8	90	531	
		12:05	3.84	23.91	7.29	432	0.9	11	357	
Site 1	12/15/15	8:42	0.25	21.70	8.12	416	7.3	83	370	0.81
		8:42	0.50	21.71	8.19	416	7.3	83	373	
		8:43	1.00	21.69	8.24	418	7.3	83	375	
		8:43	1.50	21.69	8.26	417	7.3	83	376	
		8:44	2.00	21.68	8.28	418	7.3	83	376	
		8:45	2.50	21.66	8.28	417	7.3	83	376	
		8:46	3.00	21.60	8.28	417	7.2	81	376	
		8:47	3.50	21.06	8.24	421	6.8	77	375	
		8:48	3.58	21.27	8.16	422	0.8	9	300	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 1	2/3/16	8:46	0.25	18.30	8.54	371	10.2	109	337	0.72
		8:47	0.50	18.31	8.53	371	10.1	107	337	
		8:47	1.00	18.21	8.53	370	10.1	107	337	
		8:48	1.50	18.09	8.54	371	10.1	107	337	
		8:48	2.00	17.83	8.54	371	10.1	107	338	
		8:49	2.50	17.52	8.52	371	10.1	106	338	
		8:50	3.00	17.39	8.47	370	9.8	103	339	
		8:50	3.50	16.97	8.29	373	8.9	92	343	
		8:53	4.00	16.26	7.28	398	0.7	7	241	
Site 1	3/10/16	9:29	0.25	19.92	8.41	377	9.6	105	272	0.60
		9:30	0.50	19.91	8.40	377	9.4	103	270	
		9:30	1.00	19.91	8.41	377	9.2	101	270	
		9:31	1.50	19.90	8.41	377	9.1	100	269	
		9:32	2.00	19.90	8.41	377	9.1	100	267	
		9:32	2.50	19.80	8.34	377	8.7	95	268	
		9:33	3.00	19.67	8.26	378	8.4	91	269	
		9:33	3.50	19.67	8.21	378	8.1	88	270	
		9:34	4.00	19.58	7.78	382	5.8	63	271	
		9:35	4.08	19.54	7.58	381	4.8	52	273	
Lake Yale - Site 1 Geometric Mean Values by Depth			**0.25**	**25.06**	**8.48**	**398**	**7.6**	**92**	**445**	**0.75**
			0.50	**25.07**	**8.49**	**398**	**7.5**	**91**	**446**	
			1.00	**25.04**	**8.50**	**398**	**7.3**	**89**	**447**	
			1.50	**25.03**	**8.51**	**398**	**7.3**	**88**	**447**	
			2.00	**24.98**	**8.51**	**398**	**7.2**	**88**	**447**	
			2.50	**24.87**	**8.50**	**398**	**7.1**	**86**	**448**	
			3.00	**24.78**	**8.41**	**400**	**6.0**	**73**	**430**	
			3.50	**24.40**	**7.97**	**413**	**2.9**	**35**	**405**	
			4.00	**24.67**	**7.58**	**431**	**1.1**	**14**	**309**	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 2	3/26/15	7:29	0.25	24.00	7.79	407	6.3	75	464	1.54
		7:29	0.50	24.04	7.79	405	6.2	74	464	
		7:30	1.00	24.05	7.79	404	6.1	72	464	
		7:31	1.50	24.05	7.79	406	6.0	71	463	
		7:31	2.00	24.05	7.79	407	5.7	68	463	
		7:32	2.50	24.03	7.78	407	5.7	68	463	
		7:33	3.00	23.98	7.76	407	5.5	65	463	
		7:33	3.10	23.95	7.74	406	4.9	58	462	
Site 2	4/30/15	10:14	0.25	24.86	8.53	404	8.0	96	445	0.74
		10:15	0.50	24.89	8.53	404	8.0	97	443	
		10:16	1.00	24.86	8.53	404	7.8	94	442	
		10:17	1.50	24.83	8.53	404	7.6	91	439	
		10:18	2.00	24.69	8.53	404	7.6	92	437	
		10:19	2.50	24.57	8.51	404	7.7	92	435	
		10:20	2.94	24.54	8.51	403	7.1	85	433	
Site 2	5/28/15	9:13	0.25	28.32	8.99	407	8.3	106	472	0.55
		9:14	0.50	28.35	9.00	407	8.3	106	470	
		9:14	1.00	28.34	9.00	407	8.1	105	469	
		9:15	1.50	28.32	9.00	407	8.0	103	468	
		9:16	2.00	28.29	9.00	407	8.1	104	467	
		9:17	2.50	28.25	9.00	407	7.8	101	466	
		9:17	3.00	28.21	8.99	407	7.8	101	465	
		9:20	3.05	28.20	8.98	407	6.7	86	461	
Site 2	6/18/15	8:00	0.25	30.75	9.04	402	8.0	108	496	0.61
		8:00	0.50	30.74	9.06	401	8.0	107	495	
		8:01	1.00	30.75	9.06	402	7.8	105	494	
		8:02	1.50	30.70	9.05	401	7.4	99	490	
		8:02	2.00	30.19	9.03	402	6.7	89	484	
		8:03	2.50	29.34	8.94	404	5.8	76	478	
		8:04	2.93	29.32	8.89	405	5.4	71	474	
Site 2	7/29/15	7:25	0.25	29.05	8.81	385	6.6	86	514	0.71
		7:26	0.50	29.06	8.82	385	6.5	85	513	
		7:26	1.00	29.06	8.82	385	6.5	85	511	
		7:27	1.50	29.05	8.82	385	6.5	85	510	
		7:27	2.00	29.05	8.82	385	6.6	85	508	
		7:28	2.50	29.06	8.82	385	6.4	83	507	
		7:29	3.00	29.07	8.82	385	6.4	84	505	
		7:30	3.33	29.05	8.32	392	5.6	72	462	
Site 2	8/27/15	10:29	0.25	31.24	8.91	391	6.6	89	487	0.65
		10:30	0.50	31.25	8.92	391	6.2	84	487	
		10:31	1.00	31.13	8.87	391	5.7	77	486	
		10:31	1.50	31.10	8.86	391	5.5	74	485	
		10:32	2.00	30.93	8.84	391	5.4	72	482	
		10:32	2.50	30.83	8.83	391	5.2	69	481	
		10:33	3.00	30.79	8.81	392	5.1	68	478	
		10:34	3.32	30.77	8.73	393	4.8	64	477	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 2	9/22/15	8:38	0.25	27.36	8.55	376	6.8	86	481	0.65
		8:39	0.50	27.37	8.56	376	6.5	82	480	
		8:39	1.00	27.36	8.58	375	6.5	83	479	
		8:40	1.50	27.36	8.57	376	6.4	80	476	
		8:40	2.00	27.32	8.56	375	6.3	79	474	
		8:41	2.50	27.30	8.55	376	6.1	78	472	
		8:41	3.00	27.26	8.53	375	6.1	78	467	
		8:42	3.50	27.15	8.47	375	5.8	73	463	
		8:43	3.66	27.10	7.77	393	3.4	43	393	
Site 2	10/28/15	9:34	0.25	23.78	8.14	417	7.5	88	469	0.80
		9:34	0.50	23.99	8.19	418	7.3	86	469	
		9:35	1.00	23.99	8.23	418	7.2	86	469	
		9:36	1.50	23.99	8.24	415	7.1	84	468	
		9:37	2.00	23.99	8.26	417	7.1	84	467	
		9:38	2.50	23.99	8.27	417	7.0	83	467	
		9:38	3.00	23.99	8.28	416	7.0	83	465	
		9:39	3.50	23.98	8.28	417	7.0	82	465	
		9:39	3.76	23.98	8.28	418	6.9	81	462	
Site 2	11/23/15	12:16	0.25	22.09	8.16	413	8.6	98	531	0.72
		12:17	0.50	22.10	8.20	413	8.2	94	531	
		12:18	1.00	22.10	8.21	413	8.1	93	530	
		12:19	1.50	22.05	8.20	413	8.1	92	530	
		12:20	2.00	22.04	8.21	413	8.1	93	530	
		12:21	2.50	21.98	8.20	414	8.0	92	529	
		12:22	3.00	21.80	8.17	413	7.9	90	527	
		12:22	3.50	21.74	8.13	415	7.8	88	526	
		12:23	3.86	21.72	8.12	415	7.6	87	524	
Site 2	12/15/15	9:11	0.25	21.09	8.36	418	7.6	86	398	0.77
		9:11	0.50	21.09	8.36	418	7.6	86	398	
		9:12	1.00	21.08	8.36	418	7.7	86	397	
		9:12	1.50	21.04	8.35	419	7.7	86	396	
		9:13	2.00	21.04	8.34	417	7.6	85	395	
		9:13	2.50	21.03	8.34	418	7.4	83	395	
		9:14	3.00	21.03	8.34	417	7.4	82	394	
		9:15	3.22	21.03	8.33	418	6.3	71	392	
Site 2	2/3/16	9:25	0.25	15.51	8.35	374	9.4	95	216	0.70
		9:25	0.50	15.50	8.35	373	9.3	93	213	
		9:26	1.00	15.49	8.34	373	9.1	91	211	
		9:27	1.50	15.47	8.34	373	9.1	91	210	
		9:27	2.00	15.43	8.32	374	9.0	91	208	
		9:28	2.50	15.40	8.31	374	8.9	89	206	
		9:28	3.00	15.41	8.31	374	8.8	89	205	
		9:29	3.50	15.31	8.26	374	8.6	86	203	
		9:30	4.00	15.24	7.75	375	4.6	46	202	
		9:30	4.05	15.26	7.58	373	2.9	29	200	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 2	3/10/16	10:05	0.25	19.54	8.36	378	9.8	106	454	0.60
		10:06	0.50	19.53	8.35	377	9.3	101	451	
		10:06	1.00	19.50	8.38	377	9.2	100	450	
		10:07	1.50	19.52	8.35	377	9.1	100	450	
		10:07	2.00	19.51	8.35	377	9.1	100	441	
		10:08	2.50	19.51	8.35	377	9.1	100	440	
		10:08	3.00	19.47	8.34	377	9.0	98	438	
		10:09	3.44	19.45	7.94	388	7.4	81	438	
Lake Yale - Site 2 Geometric Mean Values by Depth			**0.25**	**24.34**	**8.49**	**397**	**7.7**	**93**	**443**	**0.71**
			0.50	**24.37**	**8.50**	**397**	**7.5**	**91**	**441**	
			1.00	**24.35**	**8.51**	**397**	**7.4**	**89**	**440**	
			1.50	**24.34**	**8.50**	**397**	**7.3**	**88**	**439**	
			2.00	**24.27**	**8.50**	**397**	**7.2**	**86**	**436**	
			2.50	**24.18**	**8.48**	**397**	**7.0**	**84**	**435**	
			3.00	**24.14**	**8.47**	**397**	**6.9**	**82**	**433**	
			3.50	**23.60**	**8.31**	**398**	**6.4**	**76**	**423**	
			4.00	**23.69**	**8.27**	**399**	**5.9**	**71**	**409**	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 3	3/26/15	6:53	0.25	24.03	7.65	407	5.0	60	498	1.51
		6:53	0.50	24.04	7.64	406	4.8	57	494	
		6:54	1.00	24.04	7.64	405	4.6	55	486	
		6:54	1.50	24.05	7.63	407	4.6	55	480	
		6:55	2.00	24.05	7.62	406	4.6	55	475	
		6:55	2.50	24.05	7.62	406	4.6	55	423	
		6:56	2.96	23.99	7.50	406	2.9	34	406	
Site 3	4/30/15	9:51	0.25	24.88	8.53	406	8.2	99	509	0.72
		9:52	0.50	24.89	8.54	406	8.0	97	509	
		9:53	1.00	24.90	8.54	406	7.7	93	509	
		9:54	1.50	24.87	8.53	405	7.8	94	508	
		9:55	2.00	24.84	8.53	405	7.7	93	508	
		9:55	2.50	24.55	8.47	405	7.1	86	505	
		9:58	2.85	24.71	7.51	430	0.6	8	438	
Site 3	5/28/15	7:59	0.25	27.52	8.90	407	8.4	107	555	0.58
		7:59	0.50	27.53	8.92	407	8.3	105	553	
		8:00	1.00	27.53	8.93	407	7.8	99	550	
		8:01	1.50	27.53	8.94	407	7.6	97	547	
		8:02	2.00	27.52	8.93	407	7.9	100	544	
		8:03	2.50	27.51	8.92	407	7.3	92	542	
		8:04	2.78	27.50	8.03	423	1.0	13	301	
Site 3	6/18/15	7:12	0.25	28.74	8.94	401	8.2	106	594	0.22
		7:13	0.50	28.78	8.98	402	8.2	106	589	
		7:13	1.00	28.51	8.99	401	7.9	101	585	
		7:14	1.50	28.47	9.00	401	7.8	101	583	
		7:15	2.00	28.45	9.00	401	7.6	98	581	
		7:15	2.50	28.44	9.00	402	7.5	96	580	
		7:17	2.78	28.28	7.63	445	1.0	13	482	
Site 3	7/29/15	6:57	0.25	28.80	8.51	385	6.2	80	614	0.65
		6:58	0.50	28.81	8.68	387	6.3	81	605	
		6:59	1.00	28.82	8.72	385	6.1	80	599	
		7:00	1.50	28.82	8.74	385	6.2	80	594	
		7:00	2.00	28.82	8.75	385	6.3	82	591	
		7:01	2.50	28.84	8.76	385	6.3	81	588	
		7:03	2.83	28.85	7.16	453	0.4	5	325	
Site 3	8/27/15	10:05	0.25	30.63	8.57	390	5.3	71	469	0.65
		10:05	0.50	30.65	8.53	391	5.2	70	469	
		10:06	1.00	30.64	8.53	390	4.9	66	465	
		10:07	1.50	30.44	8.55	390	4.7	63	459	
		10:08	2.00	30.32	8.57	391	4.4	59	450	
		10:08	2.50	30.16	8.48	391	4.1	55	437	
		10:09	2.94	30.15	7.93	410	2.0	27	418	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 3	9/22/15	9:19	0.25	28.60	8.62	378	6.7	86	480	0.62
		9:20	0.50	28.60	8.63	378	6.5	84	480	
		9:20	1.00	28.58	8.64	378	6.4	83	478	
		9:20	1.50	28.56	8.64	377	6.4	83	478	
		9:21	2.00	28.55	8.62	378	6.2	81	474	
		9:22	2.50	28.27	8.19	381	4.0	51	465	
		9:24	3.00	28.00	7.27	407	0.2	3	144	
		9:25	3.19	27.95	7.18	418	0.2	2	99	
Site 3	10/28/15	9:11	0.25	23.98	8.07	417	6.6	79	438	0.68
		9:12	0.50	23.98	8.07	417	6.3	75	437	
		9:12	1.00	23.97	8.07	419	6.3	74	437	
		9:13	1.50	23.97	8.06	417	6.1	72	436	
		9:13	2.00	23.98	8.06	416	6.0	71	435	
		9:14	2.50	23.97	8.06	418	5.9	70	435	
		9:15	3.00	23.98	8.06	417	5.9	70	435	
		9:16	3.30	24.01	8.05	423	0.9	11	413	
Site 3	11/23/15	13:04	0.25	21.86	8.28	414	8.1	93	384	
		13:05	0.50	21.86	8.28	414	7.6	87	383	
		13:06	1.00	21.86	8.28	414	7.5	85	382	
		13:07	1.50	21.84	8.27	415	7.4	85	381	
		13:08	2.00	21.83	8.27	414	7.4	85	377	
		13:09	2.50	21.74	8.26	414	7.4	84	375	
		13:10	2.94	22.57	7.57	426	0.5	6	373	
Site 3	12/15/15	9:44	0.25	21.08	8.28	423	7.6	85	315	0.76
		9:44	0.50	21.06	8.29	423	7.6	86	316	
		9:45	1.00	21.06	8.29	424	7.6	85	315	
		9:45	1.50	21.04	8.28	424	7.5	84	313	
		9:46	2.00	21.01	8.28	424	7.3	82	313	
		9:46	2.50	20.97	8.27	424	7.2	81	312	
		9:47	2.98	21.30	8.23	425	6.6	75	307	
Site 3	2/3/16	9:57	0.25	15.32	8.15	373	8.7	87	257	0.71
		9:58	0.50	15.29	8.15	373	8.6	86	254	
		9:59	1.00	15.22	8.14	373	8.4	83	253	
		9:59	1.50	15.21	8.14	374	8.3	83	253	
		10:00	2.00	15.22	8.14	373	8.2	82	252	
		10:00	2.50	15.16	8.13	373	8.1	81	252	
		10:01	3.00	14.77	7.95	374	6.5	64	251	
		10:02	3.40	14.62	7.55	378	2.9	29	251	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 3	3/10/16	10:34	0.25	19.55	8.33	378	9.4	103	220	0.60
		10:35	0.50	19.54	8.35	378	9.2	100	217	
		10:35	1.00	19.53	8.35	378	9.1	99	215	
		10:36	1.50	19.52	8.36	377	8.9	97	215	
		10:37	2.00	19.51	8.35	377	9.0	98	212	
		10:37	2.50	19.52	8.35	377	9.0	98	209	
		10:38	3.00	19.46	7.73	380	6.3	69	206	
		10:39	3.19	19.30	7.16	384	1.6	18	203	
Lake Yale - Site 3 Mean Values	**Geometric by Depth**		**0.25**	**24.16**	**8.40**	**398**	**7.2**	**87**	**425**	**0.65**
			0.50	**24.16**	**8.41**	**398**	**7.1**	**85**	**423**	
			1.00	**24.13**	**8.42**	**398**	**6.9**	**82**	**420**	
			1.50	**24.10**	**8.42**	**398**	**6.8**	**82**	**418**	
			2.00	**24.09**	**8.42**	**398**	**6.8**	**81**	**415**	
			2.50	**24.01**	**8.37**	**398**	**6.3**	**76**	**408**	
			3.00	**24.04**	**7.71**	**416**	**1.6**	**19**	**323**	
			3.50	**20.86**	**7.48**	**400**	**0.9**	**11**	**214**	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 4	3/26/15	8:17	0.25	24.08	7.78	407	5.7	68	443	1.67
		8:18	0.50	24.09	7.77	407	5.7	68	442	
		8:19	1.00	24.09	7.77	407	5.8	69	442	
		8:20	1.50	24.09	7.76	406	5.6	67	442	
		8:20	2.00	24.09	7.76	407	5.6	66	442	
		8:21	2.50	24.08	7.75	407	5.5	66	442	
		8:21	3.00	24.08	7.74	407	5.3	62	441	
		8:22	3.50	24.05	7.73	407	5.2	62	441	
		8:22	4.00	24.00	7.73	406	5.2	62	440	
		8:23	4.50	23.95	7.72	407	5.1	61	440	
		8:24	5.00	23.93	7.68	407	4.4	52	440	
		8:25	5.17	23.80	7.49	405	1.4	17	421	
Site 4	4/30/15	11:07	0.25	25.10	8.50	405	8.2	99	486	0.58
		11:08	0.50	25.10	8.49	406	8.0	97	485	
		11:09	1.00	25.09	8.49	405	7.8	95	484	
		11:09	1.50	25.07	8.50	405	7.6	92	484	
		11:10	2.00	25.05	8.50	406	8.0	97	484	
		11:11	2.50	25.06	8.49	406	7.9	96	483	
		11:11	3.00	25.03	8.49	406	8.0	97	481	
		11:12	3.50	25.00	8.47	406	7.9	96	480	
		11:12	3.64	25.01	8.41	406	7.3	88	479	
Site 4	5/28/15	8:19	0.25	27.96	8.96	407	8.4	107	502	0.57
		8:19	0.50	27.95	8.96	407	8.2	104	500	
		8:20	1.00	27.95	8.96	407	8.0	102	500	
		8:21	1.50	27.96	8.96	406	7.8	100	498	
		8:22	2.00	27.96	8.97	406	7.9	101	497	
		8:23	2.50	27.95	8.97	407	7.7	99	496	
		8:23	3.00	27.95	8.97	407	7.8	99	496	
		8:25	3.50	27.93	8.96	407	7.6	97	493	
		8:27	4.00	27.90	8.95	408	7.8	99	490	
		8:27	4.50	27.85	8.92	408	7.3	93	484	
		8:28	4.82	27.77	7.99	437	3.0	38	449	
Site 4	6/18/15	7:44	0.25	29.77	9.08	401	8.5	112	497	0.53
		7:45	0.50	29.79	9.09	400	8.5	112	496	
		7:45	1.00	29.76	9.10	401	8.2	109	493	
		7:46	1.50	29.73	9.09	400	8.1	107	490	
		7:46	2.00	29.68	9.07	400	7.8	103	489	
		7:47	2.50	29.56	9.06	401	7.7	101	488	
		7:47	3.00	29.48	9.05	401	7.6	100	485	
		7:48	3.50	29.39	9.04	401	7.3	96	483	
		7:49	4.00	29.24	8.97	403	6.1	79	478	
		7:50	4.50	28.43	8.57	412	2.7	34	453	
		7:52	5.00	28.13	7.03	554	0.3	3	353	
		7:52	5.24	28.14	6.97	590	0.2	3	246	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 4	7/29/15	7:12	0.25	28.84	8.70	388	6.2	80	481	0.55
		7:13	0.50	28.85	8.71	387	6.1	79	478	
		7:14	1.00	28.87	8.71	387	6.0	77	476	
		7:14	1.50	28.86	8.71	387	5.9	77	472	
		7:15	2.00	28.85	8.71	387	6.0	78	471	
		7:16	2.50	28.79	8.71	386	6.0	78	469	
		7:16	3.00	28.70	8.71	385	6.0	78	465	
		7:17	3.27	28.62	8.69	385	5.8	76	459	
Site 4	8/27/15	10:17	0.25	30.74	8.91	390	6.3	84	452	0.65
		10:17	0.50	30.73	8.92	390	6.1	81	451	
		10:18	1.00	30.72	8.92	390	6.0	80	450	
		10:18	1.50	30.59	8.90	390	5.7	76	448	
		10:19	2.00	30.51	8.85	390	5.5	74	445	
		10:20	2.50	30.50	8.85	390	5.5	74	442	
		10:20	3.00	30.50	8.85	390	5.5	73	435	
		10:21	3.50	30.49	8.85	390	5.3	70	429	
		10:21	3.91	30.47	8.84	391	5.2	70	412	
Site 4	9/22/15	9:02	0.25	28.12	8.62	375	7.2	92	467	0.59
		9:03	0.50	28.11	8.69	376	7.0	90	467	
		9:04	1.00	28.10	8.70	375	7.0	89	467	
		9:04	1.50	28.08	8.70	376	6.7	86	467	
		9:05	2.00	27.99	8.66	376	6.6	85	467	
		9:06	2.50	27.84	8.63	376	6.5	83	465	
		9:06	3.00	27.77	8.57	376	6.2	79	465	
		9:07	3.50	27.72	8.49	377	5.7	73	464	
		9:08	4.00	27.68	8.44	377	5.4	68	464	
		9:08	4.50	27.56	8.18	380	4.0	50	442	
		9:09	4.98	27.52	8.05	381	3.6	46	440	
Site 4	10/28/15	8:57	0.25	24.19	8.38	416	6.8	81	489	0.78
		8:57	0.50	24.19	8.38	416	6.8	81	482	
		8:58	1.00	24.20	8.38	416	6.8	81	478	
		8:58	1.50	24.19	8.38	417	6.9	82	478	
		8:59	2.00	24.20	8.38	417	6.9	82	476	
		8:59	2.50	24.19	8.37	417	6.9	82	476	
		9:00	3.00	24.19	8.37	417	6.9	82	474	
		9:01	3.50	24.18	8.37	417	6.8	81	472	
		9:01	4.00	24.19	8.36	416	6.7	80	464	
		9:02	4.50	24.19	8.36	419	6.7	80	461	
		9:02	5.00	24.19	8.35	420	6.6	79	450	
		9:03	5.50	24.22	8.18	422	5.3	63	384	
		9:03	5.65	24.46	7.59	489	0.4	4	284	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 4	11/23/15	12:45	0.25	22.54	8.18	414	8.6	100	476	0.71
		12:46	0.50	22.62	8.23	415	8.5	98	475	
		12:47	1.00	22.61	8.26	415	8.5	98	475	
		12:48	1.50	22.61	8.26	415	8.4	97	475	
		12:49	2.00	22.60	8.26	416	8.5	98	474	
		12:50	2.50	22.61	8.28	415	8.5	98	474	
		12:51	3.00	22.60	8.28	415	8.5	98	474	
		12:52	3.50	22.60	8.28	416	8.5	98	473	
		12:53	4.00	22.59	8.28	417	8.5	98	472	
		12:54	4.31	22.61	8.28	416	8.3	96	471	
Site 4	12/15/15	8:57	0.25	21.41	8.37	416	7.7	87	371	0.70
		8:57	0.50	21.39	8.37	416	7.6	85	367	
		8:58	1.00	21.45	8.38	416	7.6	85	365	
		8:58	1.50	21.37	8.38	417	7.5	85	298	
		8:59	2.00	21.31	8.36	416	7.4	84	294	
		9:00	2.50	21.21	8.37	417	7.2	81	291	
		9:00	3.00	21.16	8.31	417	7.0	78	291	
		9:01	3.50	21.14	8.29	419	6.9	78	290	
		9:01	4.00	21.12	8.28	418	6.9	77	290	
		9:02	4.50	21.11	8.25	419	6.8	76	287	
		9:03	5.00	21.08	8.19	419	6.2	70	286	
		9:04	5.13	21.13	8.15	424	1.8	20	285	
Site 4	2/3/16	9:07	0.25	17.16	8.54	372	10.4	108	388	0.70
		9:08	0.50	16.84	8.51	373	10.1	104	383	
		9:09	1.00	16.70	8.49	372	9.9	102	375	
		9:09	1.50	15.93	8.38	373	9.4	95	368	
		9:10	2.00	15.86	8.40	373	9.4	95	337	
		9:11	2.50	15.80	8.39	372	9.2	93	328	
		9:11	3.00	15.73	8.39	372	9.2	93	304	
		9:12	3.50	15.31	8.27	374	8.6	87	302	
		9:13	4.00	14.81	8.03	376	7.4	73	297	
		9:13	4.50	14.48	7.82	378	6.1	60	295	
		9:14	5.00	14.42	7.78	379	5.7	56	291	
		9:16	5.41	15.32	6.78	430	0.5	5	190	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 4	3/10/16	9:48	0.25	19.92	8.36	377	9.3	102	251	0.60
		9:48	0.50	19.92	8.37	377	9.1	100	251	
		9:49	1.00	19.90	8.37	377	9.0	99	250	
		9:49	1.50	19.86	8.36	377	8.8	96	250	
		9:50	2.00	19.85	8.35	377	8.9	97	248	
		9:50	2.50	19.78	8.32	377	8.8	96	247	
		9:51	3.00	19.70	8.28	378	8.5	93	246	
		9:51	3.50	19.69	8.28	378	8.4	92	245	
		9:52	4.00	19.66	8.29	377	8.4	92	245	
		9:53	4.50	19.63	8.28	378	8.3	91	244	
		9:54	5.00	19.56	6.82	471	0.6	7	149	
		9:55	5.03	19.51	6.79	475	0.4	5	105	
Lake Yale - Site 4 Geometric Mean Values by Depth			**0.25**	**24.64**	**8.52**	**397**	**7.6**	**92**	**435**	**0.60**
			0.50	**24.61**	**8.53**	**397**	**7.5**	**91**	**433**	
			1.00	**24.59**	**8.54**	**397**	**7.4**	**90**	**431**	
			1.50	**24.47**	**8.52**	**397**	**7.3**	**88**	**422**	
			2.00	**24.43**	**8.52**	**397**	**7.3**	**88**	**418**	
			2.50	**24.38**	**8.51**	**397**	**7.2**	**86**	**416**	
			3.00	**24.34**	**8.49**	**397**	**7.1**	**85**	**411**	
			3.50	**24.26**	**8.47**	**398**	**6.9**	**83**	**409**	
			4.00	**23.80**	**8.41**	**399**	**6.7**	**80**	**401**	
			4.50	**22.88**	**8.26**	**401**	**5.8**	**68**	**386**	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 5	4/30/15	10:27	0.25	24.00	7.91	409	7.0	83	485	0.99
		10:27	0.50	24.00	7.89	409	7.0	83	483	
		10:28	1.00	23.96	7.87	409	6.8	80	480	
		10:29	1.50	23.67	7.86	408	6.7	80	475	
		10:29	1.55	23.63	7.86	408	6.7	79	437	
Site 5	5/28/15	9:28	0.25	27.27	8.19	427	6.8	86	437	0.82
		9:28	0.50	27.25	8.13	427	6.2	79	437	
		9:29	1.00	27.26	8.10	427	6.4	80	436	
		9:30	1.48	27.16	8.06	426	5.9	74	430	
Site 5	6/18/15	8:09	0.25	30.35	8.04	426	5.8	78	423	0.92
		8:10	0.50	30.37	7.98	425	5.5	74	417	
		8:11	1.00	30.34	7.95	425	5.2	70	373	
		8:11	1.36	30.28	7.90	425	4.9	65	116	
Site 5	7/29/15	7:38	0.25	27.98	7.60	359	4.4	56	384	0.71
		7:38	0.50	27.98	7.52	358	4.2	54	382	
		7:39	1.00	27.97	7.47	357	4.2	53	380	
		7:40	1.50	27.95	7.41	358	3.8	48	289	
Site 5	8/27/15	10:39	0.25	30.07	7.73	362	3.9	52	437	0.30
		10:40	0.50	29.59	7.51	357	2.5	33	426	
		10:41	1.00	29.12	7.34	349	1.4	19	422	
		10:41	1.50	28.45	6.97	429	0.4	5	422	
		10:43	1.61	28.12	6.50	509	0.2	2	154	
Site 5	9/22/15	8:49	0.25	26.24	7.37	323	2.0	24	446	0.40
		8:50	0.50	26.24	7.25	323	1.8	23	440	
		8:51	1.00	26.23	7.19	322	1.7	21	436	
		8:52	1.50	25.88	6.77	376	0.4	5	434	
		8:53	1.76	25.70	6.46	452	0.3	4	419	
Site 5	10/28/15	9:25	0.25	23.33	7.80	407	4.0	47	334	0.80
		9:26	0.50	23.33	7.61	403	3.6	42	330	
		9:27	1.00	23.34	7.53	404	3.3	39	328	
		9:28	1.50	23.34	7.52	404	3.2	38	327	
		9:29	1.86	23.34	7.47	405	3.1	37	326	

Field Measurements Collected in Lake Yale from March 2105 - March 2106

Site	Date	Time	Depth (m)	Temp. (°C)	pH (s.u.)	Cond. (µmho/cm)	Diss. O_2 (mg/L)	DO Sat. (%)	ORP (mV)	Secchi Depth (m)
Site 5	11/23/15	12:31	0.25	21.08	7.64	395	6.7	76	324	0.52
		12:32	0.50	21.10	7.54	396	6.3	71	235	
		12:33	1.00	21.01	7.46	396	6.0	67	231	
		12:34	1.50	20.87	7.41	399	6.0	67	228	
		12:35	1.72	20.75	7.40	402	5.8	65	224	
Site 5	12/15/15	9:20	0.25	21.10	7.64	412	4.4	49	195	0.70
		9:21	0.50	20.97	7.56	414	4.2	47	194	
		9:22	1.00	20.89	7.51	413	4.0	44	188	
		9:22	1.50	20.86	7.45	411	3.8	42	184	
		9:23	1.61	20.77	7.39	412	3.0	34	180	
Site 5	2/3/16	9:39	0.25	17.80	7.22	354	5.8	61	297	0.60
		9:39	0.50	17.78	7.19	353	5.4	57	288	
		9:40	1.00	17.51	7.14	352	4.3	45	284	
		9:41	1.50	15.32	7.00	354	1.1	11	280	
		9:41	1.68	15.21	6.99	355	0.7	7	247	
Site 5	3/10/16	10:16	0.25	19.72	7.34	371	6.6	72	298	0.60
		10:17	0.50	19.70	7.31	371	6.3	69	295	
		10:17	1.00	19.70	7.28	371	6.2	68	294	
		10:18	1.50	19.52	7.15	369	5.4	58	292	
		10:19	1.79	19.28	7.03	369	4.1	45	285	
Lake Yale - Site 5 Geometric Mean Values by Depth			**0.25**	**24.11**	**7.67**	**384**	**4.9**	**59**	**358**	**0.69**
			0.50	**24.05**	**7.58**	**384**	**4.5**	**54**	**344**	
			1.00	**23.96**	**7.53**	**383**	**4.0**	**48**	**338**	
			1.50	**23.52**	**7.40**	**395**	**2.7**	**31**	**294**	
			2.00	**21.77**	**7.12**	**412**	**1.6**	**18**	**267**	

E.2 Lab Measurements

Characteristics of Surface Water Samples Collected in Lake Yale from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-623	Site #1	Surface	3/26/15	141	34	47	1,168	715	1,964	6	2	18	26	1.6	22	2.2	1.5	74	23
15-852	Site #1	Surface	4/30/15	136	28	59	1,068	850	2,005	8	1	19	28	5.0	17	6.2	9.6	73	49
15-1037	Site #1	Surface	5/28/15	146	10	72	1,028	727	1,837	3	1	18	22	9.8	22	18.4	29.7	84	66
15-1163	Site #1	Surface	6/18/15	134	3	3	1,196	594	1,796	2	6	14	22	6.9	17	9.6	12.2	82	53
15-1462	Site #1	Surface	7/29/15	130	3	3	1,154	535	1,695	7	8	14	29	6.3	11	15.6	24.3	58	63
15-1730	Site #1	Surface	8/27/15	129	3	3	1,254	599	1,859	16	2	31	48	6.2	62	19.8	22.7	39	62
15-1999	Site #1	Surface	9/22/15	124	3	3	1,162	571	1,739	14	1	11	26	4.2	35	5.8	14.5	68	55
15-2331	Site #1	Surface	10/28/15	138	53	4	929	460	1,446	7	5	16	28	6.0	31	11.5	41.8	52	71
15-2545	Site #1	Surface	11/23/15	132	3	11	1,508	589	2,111	8	23	26	57	6.3	38	9.3	35.1	37	68
15-2844	Site #1	Surface	12/15/15	129	3	4	1,508	633	2,148	7	2	13	22	4.8	26	3.8	19.5	98	60
16-374	Site #1	Surface	2/3/16	121	4	3	1,215	597	1,819	3	14	16	33	3.9	35	7.3	15.7	55	56
16-696	Site #1	Surface	3/10/16	123	5	6	1,024	488	1,522	10	4	12	26	5.0	39	9.7	21.0	59	61
Minimum Value:				**121**	**3**	**3**	**929**	**460**	**1,446**	**2**	**1**	**11**	**22**	**1.6**	**11**	**2.2**	**1.5**	**37**	**23**
Maximum Value:				**146**	**53**	**72**	**1,508**	**850**	**2,148**	**16**	**23**	**31**	**57**	**9.8**	**62**	**19.8**	**41.8**	**98**	**71**
Arithmetic Value:				**132**	**13**	**18**	**1,184**	**613**	**1,828**	**7**	**6**	**17**	**31**	**5.5**	**30**	**9.9**	**20.6**	**65**	**57**
Geometric Mean:				**132**	**7**	**8**	**1,173**	**605**	**1,817**	**6**	**4**	**17**	**29**	**5.1**	**27**	**8.4**	**16.5**	**62**	**55**

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-624	Site #1	Bottom	3/26/15	138	521	48	1,005	980	2,554	4	2	22	28	1.5	21	2.6	-	-	-
15-853	Site #1	Bottom	4/30/15	138	155	60	860	550	1,625	7	4	16	27	5.4	18	5.8	-	-	-
15-1038	Site #1	Bottom	5/28/15	142	92	71	853	621	1,638	2	2	16	20	9.3	20	16.4	-	-	-
15-1164	Site #1	Bottom	6/18/15	163	3	3	913	730	1,648	3	3	15	21	7.9	14	17.2	-	-	-
15-1463	Site #1	Bottom	7/29/15	127	3	3	1,142	703	1,850	6	9	26	42	6.4	10	15.6	-	-	-
15-1733	Site #1	Bottom	8/27/15	128	3	3	1,341	441	1,787	17	3	25	45	7.8	20	19.6	-	-	-
15-2000	Site #1	Bottom	9/22/15	126	3	3	1,111	592	1,709	9	3	14	26	5.2	36	6.8	-	-	-
15-2332	Site #1	Bottom	10/28/15	129	30	3	1,096	338	1,468	6	9	13	28	5.3	34	10.9	-	-	-
15-2546	Site #1	Bottom	11/23/15	133	3	3	1,241	794	2,041	14	9	27	50	6.4	155	13.7	-	-	-
15-2845	Site #1	Bottom	12/15/15	123	3	3	1,258	693	1,957	9	7	6	22	5.1	28	5.5	-	-	-
16-375	Site #1	Bottom	2/3/16	119	31	3	1,124	272	1,430	3	10	19	32	4.5	34	6.3	-	-	-
16-697	Site #1	Bottom	3/10/16	128	5	4	883	386	1,278	8	7	8	23	7.3	36	9.7	-	-	-
Minimum Value:				**119**	**3**	**3**	**853**	**272**	**1,278**	**2**	**2**	**6**	**20**	**1.5**	**10**	**2.6**	-	-	-
Maximum Value:				**163**	**521**	**71**	**1,341**	**980**	**2,554**	**17**	**10**	**27**	**50**	**9.3**	**155**	**19.6**	-	-	-
Arithmetic Value:				**133**	**71**	**17**	**1,069**	**592**	**1,749**	**7**	**6**	**17**	**30**	**6.0**	**36**	**10.8**	-	-	-
Geometric Mean:				**132**	**13**	**7**	**1,057**	**556**	**1,722**	**6**	**5**	**16**	**29**	**5.6**	**27**	**9.3**	-	-	-

Characteristics of Surface Water Samples Collected in Lake Yale from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-625	Site #2	Surface	3/26/15	142	35	38	1,159	568	1,800	4	6	11	21	1.3	22	2.8	0.9	87	15
15-854	Site #2	Surface	4/30/15	141	18	56	1,054	569	1,697	6	2	17	26	5.0	20	8.0	10.7	66	51
15-1039	Site #2	Surface	5/28/15	149	64	70	940	592	1,666	3	5	13	21	7.3	19	14.6	24.4	78	63
15-1165	Site #2	Surface	6/18/15	136	3	3	883	604	1,493	3	5	38	46	7.2	13	14.0	17.5	32	58
15-1464	Site #2	Surface	7/29/15	125	3	3	1,060	634	1,700	7	8	19	33	6.4	11	19.0	15.3	52	56
15-1732	Site #2	Surface	8/27/15	130	3	3	1,291	534	1,831	17	8	24	49	5.8	21	12.0	18.4	37	59
15-2001	Site #2	Surface	9/22/15	132	3	3	1,074	586	1,667	8	4	11	23	4.6	37	7.4	14.8	72	56
15-2333	Site #2	Surface	10/28/15	134	16	3	965	582	1,567	7	11	18	36	5.1	61	10.5	34.0	44	68
15-2547	Site #2	Surface	11/23/15	130	3	3	1,243	720	1,969	4	15	28	47	6.0	32	10.9	34.7	42	68
15-2846	Site #2	Surface	12/15/15	124	3	3	1,409	723	2,138	9	9	7	25	5.7	31	5.8	20.5	86	60
16-376	Site #2	Surface	2/3/16	124	23	3	881	499	1,406	5	15	10	30	5.0	31	7.0	25.0	47	63
16-698	Site #2	Surface	3/10/16	126	5	3	806	579	1,393	3	16	8	27	5.7	28	9.3	26.5	52	64
Minimum Value:				**124**	**3**	**3**	**806**	**499**	**1,393**	**3**	**2**	**7**	**21**	**1.3**	**11**	**2.8**	**0.9**	**32**	**15**
Maximum Value:				**149**	**64**	**70**	**1,409**	**723**	**2,138**	**17**	**16**	**38**	**49**	**7.3**	**61**	**19.0**	**34.7**	**87**	**68**
Arithmetic Value:				**133**	**15**	**16**	**1,064**	**599**	**1,694**	**6**	**9**	**17**	**32**	**5.4**	**27**	**10.1**	**20.2**	**58**	**57**
Geometric Mean:				**133**	**8**	**6**	**1,050**	**596**	**1,681**	**5**	**8**	**15**	**31**	**5.1**	**25**	**9.1**	**16.0**	**55**	**54**

15-626	Site #2	Bottom	3/26/15	145	766	36	847	738	2,387	5	2	14	20	1.9	23	2.2	-	-	-
15-855	Site #2	Bottom	4/30/15	142	468	59	729	833	2,089	7	5	17	29	7.2	20	5.4	-	-	-
15-1040	Site #2	Bottom	5/28/15	151	73	71	643	973	1,760	2	6	15	23	7.1	19	14.2	-	-	-
15-1166	Site #2	Bottom	6/18/15	138	4	3	823	686	1,516	2	3	22	28	9.7	13	10.4	-	-	-
15-1465	Site #2	Bottom	7/29/15	127	3	3	1,140	454	1,601	8	8	19	35	5.4	11	13.0	-	-	-
15-1731	Site #2	Bottom	8/27/15	131	3	3	1,140	571	1,717	16	7	18	41	6.3	24	15.8	-	-	-
15-2002	Site #2	Bottom	9/22/15	126	3	3	1,061	617	1,684	8	4	11	23	5.0	42	7.0	-	-	-
15-2334	Site #2	Bottom	10/28/15	132	3	3	937	613	1,556	7	3	23	33	5.2	34	11.8	-	-	-
15-2548	Site #2	Bottom	11/23/15	130	3	3	1,242	742	1,990	5	10	34	49	6.5	32	9.0	-	-	-
15-2847	Site #2	Bottom	12/15/15	127	3	3	1,364	658	2,028	8	7	8	23	5.3	31	7.2	-	-	-
16-377	Site #2	Bottom	2/3/16	130	34	3	1,002	396	1,435	4	11	16	31	5.6	31	7.1	-	-	-
16-699	Site #2	Bottom	3/10/16	125	4	3	1,052	293	1,352	4	12	20	36	5.0	30	9.7	-	-	-
Minimum Value:				**125**	**3**	**3**	**643**	**293**	**1,352**	**2**	**2**	**8**	**20**	**1.9**	**11**	**2.2**	**-**	**-**	**-**
Maximum Value:				**151**	**766**	**71**	**1,364**	**973**	**2,387**	**16**	**12**	**34**	**49**	**9.7**	**42**	**15.8**	**-**	**-**	**-**
Arithmetic Value:				**134**	**114**	**16**	**998**	**631**	**1,760**	**6**	**6**	**18**	**31**	**5.9**	**26**	**9.4**	**-**	**-**	**-**
Geometric Mean:				**133**	**12**	**6**	**977**	**602**	**1,736**	**5**	**6**	**17**	**30**	**5.5**	**24**	**8.5**	**-**	**-**	**-**

Characteristics of Surface Water Samples Collected in Lake Yale from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-628	Site #3	Surface	3/26/15	139	98	206	627	559	1,490	8	10	5	23	2.6	26	3.0	4.5	66	38
15-857	Site #3	Surface	4/30/15	142	19	72	667	680	1,438	6	11	8	25	4.5	22	5.0	11.2	59	52
15-1042	Site #3	Surface	5/28/15	140	11	71	645	843	1,570	2	10	6	18	6.7	21	12.2	28.9	87	65
15-1168	Site #3	Surface	6/18/15	137	33	3	1,107	551	1,694	2	10	16	28	9.7	15	10.8	22.5	60	62
15-1467	Site #3	Surface	7/29/15	130	3	3	1,174	582	1,762	4	19	33	57	7.8	13	33.4	26.1	31	64
15-1735	Site #3	Surface	8/27/15	131	3	3	1,107	517	1,630	10	15	23	48	6.0	31	9.0	16.9	34	58
15-2004	Site #3	Surface	9/22/15	125	3	3	1,110	561	1,678	10	13	6	29	4.7	40	4.4	21.7	58	61
15-2336	Site #3	Surface	10/28/15	131	3	3	1,173	407	1,586	7	16	12	35	5.1	36	11.0	42.6	46	71
15-2550	Site #3	Surface	11/23/15	135	3	3	1,276	601	1,883	4	19	23	46	5.5	33	12.5	27.7	41	65
15-2849	Site #3	Surface	12/15/15	126	3	3	1,497	650	2,153	8	5	9	22	5.4	32	5.8	23.9	98	63
16-379	Site #3	Surface	2/3/16	127	64	3	1,363	511	1,941	4	14	10	28	4.7	53	8.6	20.6	69	60
16-701	Site #3	Surface	3/10/16	126	3	3	902	464	1,372	3	15	16	34	6.5	32	12.3	22.2	40	61
Minimum Value:				**125**	**3**	**3**	**627**	**407**	**1,372**	**2**	**5**	**5**	**18**	**2.6**	**13**	**3.0**	**4.5**	**31**	**38**
Maximum Value:				**142**	**98**	**206**	**1,497**	**843**	**2,153**	**10**	**19**	**33**	**57**	**9.7**	**53**	**33.4**	**42.6**	**98**	**71**
Arithmetic Value:				**132**	**20**	**31**	**1,054**	**577**	**1,683**	**6**	**13**	**14**	**33**	**5.8**	**30**	**10.7**	**22.4**	**57**	**60**
Geometric Mean:				**132**	**8**	**7**	**1,014**	**568**	**1,670**	**5**	**12**	**12**	**31**	**5.5**	**28**	**8.8**	**20.0**	**54**	**59**

15-629	Site #3	Bottom	3/26/15	136	270	42	716	612	1,640	7	10	7	24	2.1	26	2.2	-	-	-
15-858	Site #3	Bottom	4/30/15	140	261	62	844	453	1,620	7	11	6	24	4.4	20	9.4	-	-	-
15-1043	Site #3	Bottom	5/28/15	144	104	71	931	583	1,689	1	13	13	27	8.5	20	17.0	-	-	-
15-1169	Site #3	Bottom	6/18/15	133	3	3	1,169	694	1,869	3	12	27	42	11.2	14	16.0	-	-	-
15-1468	Site #3	Bottom	7/29/15	131	3	3	951	544	1,501	6	13	27	46	6.9	11	18.2	-	-	-
15-1736	Site #3	Bottom	8/27/15	123	3	3	1,079	583	1,668	16	11	21	48	6.7	25	15.2	-	-	-
15-2005	Site #3	Bottom	9/22/15	127	3	3	1,135	499	1,640	10	7	14	31	7.8	39	12.4	-	-	-
15-2337	Site #3	Bottom	10/28/15	128	3	3	950	620	1,576	8	7	18	33	7.3	34	9.4	-	-	-
15-2551	Site #3	Bottom	11/23/15	133	3	3	1,213	779	1,998	3	17	29	50	5.1	32	9.0	-	-	-
15-2850	Site #3	Bottom	12/15/15	125	3	3	1,065	761	1,832	8	8	8	24	6.5	30	8.2	-	-	-
16-380	Site #3	Bottom	2/3/16	123	61	3	867	574	1,505	4	16	14	34	5.4	41	7.8	-	-	-
16-703	Site #3	Bottom	3/10/16	131	4	3	831	529	1,367	3	17	8	28	7.7	31	13.7	-	-	-
Minimum Value:				**123**	**3**	**3**	**716**	**453**	**1,367**	**1**	**7**	**6**	**24**	**2.1**	**11**	**2.2**	**-**	**-**	**-**
Maximum Value:				**144**	**270**	**71**	**1,213**	**779**	**1,998**	**16**	**17**	**29**	**50**	**11.2**	**41**	**18.2**	**-**	**-**	**-**
Arithmetic Value:				**131**	**60**	**17**	**979**	**603**	**1,659**	**6**	**12**	**16**	**34**	**6.6**	**27**	**11.5**	**-**	**-**	**-**
Geometric Mean:				**131**	**11**	**6**	**968**	**595**	**1,651**	**5**	**11**	**14**	**33**	**6.2**	**25**	**10.3**	**-**	**-**	**-**

Characteristics of Surface Water Samples Collected in Lake Yale from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-630	Site #4	Surface	3/26/15	141	237	33	684	538	1,492	5	4	9	18	1.2	24	1.4	2.5	82	30
15-859	Site #4	Surface	4/30/15	141	70	66	569	497	1,202	6	4	13	23	4.5	20	7.0	6.4	51	44
15-1044	Site #4	Surface	5/28/15	145	79	253	467	413	1,212	7	4	2	13	7.6	23	13.4	22.4	93	62
15-1170	Site #4	Surface	6/18/15	135	3	169	743	699	1,614	8	6	5	19	7.9	14	13.0	9.4	84	49
15-1469	Site #4	Surface	7/29/15	120	3	3	1,180	661	1,846	7	13	25	45	6.2	11	16.4	16.7	41	57
15-1737	Site #4	Surface	8/27/15	124	3	3	1,336	360	1,702	17	10	15	42	5.3	18	14.0	9.6	41	49
15-2006	Site #4	Surface	9/22/15	128	3	3	1,032	511	1,550	9	5	14	28	4.0	36	5.4	26.1	56	64
15-2338	Site #4	Surface	10/28/15	126	3	3	949	615	1,570	8	6	17	31	5.4	34	11.0	37.8	50	69
15-2552	Site #4	Surface	11/23/15	130	3	3	1,194	641	1,841	4	19	20	43	6.8	32	16.0	21.4	43	61
15-2851	Site #4	Surface	12/15/15	121	3	3	1,594	557	2,157	7	5	10	22	5.6	29	4.5	21.0	98	61
16-381	Site #4	Surface	2/3/16	126	3	3	982	442	1,430	4	18	10	32	4.9	34	5.2	24.6	45	63
16-704	Site #4	Surface	3/10/16	127	3	3	1,020	581	1,607	4	14	11	29	4.5	34	6.8	6.7	55	44
Minimum Value:				**120**	**3**	**3**	**467**	**360**	**1,202**	**4**	**4**	**2**	**13**	**1.2**	**11**	**1.4**	**2.5**	**41**	**30**
Maximum Value:				**145**	**237**	**253**	**1,594**	**699**	**2,157**	**17**	**19**	**25**	**45**	**7.9**	**36**	**16.4**	**37.8**	**98**	**69**
Arithmetic Value:				**130**	**34**	**45**	**979**	**543**	**1,602**	**7**	**9**	**13**	**29**	**5.3**	**26**	**9.5**	**17.1**	**62**	**54**
Geometric Mean:				**130**	**7**	**10**	**926**	**533**	**1,582**	**7**	**8**	**11**	**27**	**4.9**	**24**	**7.9**	**13.6**	**59**	**53**

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-632	Site #4	Bottom	3/26/15	133	957	33	896	573	2,459	6	4	13	23	1.7	24	4.0	-	-	-
15-861	Site #4	Bottom	4/30/15	142	666	61	635	650	2,012	6	11	11	28	5.2	20	8.2	-	-	-
15-1046	Site #4	Bottom	5/28/15	136	72	31	1,163	813	2,079	3	17	16	36	7.4	22	13.8	-	-	-
15-1172	Site #4	Bottom	6/18/15	134	11	3	1,047	818	1,879	2	41	27	70	15.2	14	20.0	-	-	-
15-1471	Site #4	Bottom	7/29/15	137	3	3	895	727	1,628	6	30	73	109	7.3	12	14.2	-	-	-
15-1739	Site #4	Bottom	8/27/15	129	3	3	940	802	1,748	17	9	20	46	5.9	18	14.4	-	-	-
15-2008	Site #4	Bottom	9/22/15	120	3	3	935	819	1,760	9	16	83	108	11.0	41	19.6	-	-	-
15-2340	Site #4	Bottom	10/28/15	135	3	3	976	546	1,528	8	6	14	28	8.7	34	16.2	-	-	-
15-2554	Site #4	Bottom	11/23/15	133	3	3	1,196	660	1,862	9	17	21	47	6.4	32	12.2	-	-	-
15-2853	Site #4	Bottom	12/15/15	122	14	3	1,403	610	2,030	7	5	10	22	6.8	29	7.9	-	-	-
16-383	Site #4	Bottom	2/3/16	120	233	3	783	563	1,582	4	14	13	31	4.5	31	8.1	-	-	-
16-705	Site #4	Bottom	3/10/16	135	3	3	714	571	1,291	3	14	11	28	5.5	31	6.1	-	-	-
Minimum Value:				**120**	**3**	**3**	**635**	**546**	**1,291**	**2**	**4**	**10**	**22**	**1.7**	**12**	**4.0**	**-**	**-**	**-**
Maximum Value:				**142**	**957**	**61**	**1,403**	**819**	**2,459**	**17**	**41**	**83**	**109**	**15.2**	**41**	**20.0**	**-**	**-**	**-**
Arithmetic Value:				**131**	**164**	**13**	**965**	**679**	**1,822**	**7**	**15**	**26**	**48**	**7.1**	**26**	**12.1**	**-**	**-**	**-**
Geometric Mean:				**131**	**18**	**6**	**944**	**671**	**1,798**	**6**	**12**	**20**	**41**	**6.4**	**24**	**10.9**	**-**	**-**	**-**

Characteristics of Surface Water Samples Collected in Lake Yale from March 2015 - March 2016

Indicates data listed as 1/2 of MDL

Lab ID	Site	Depth	Date Collected	Alkalinity (mg/l)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)	Chly-a (mg/m^3)	TN/TP Ratio	TSI (Chyl-a)
15-633	Site #5	Middle	3/26/15	140	218	36	789	955	1,998	7	3	22	32	2.1	34	2.1	2.9	62	32
15-862	Site #5	Middle	4/30/15	138	272	81	733	965	2,052	6	4	25	35	3.2	31	5.2	7.1	59	45
15-1047	Site #5	Middle	5/28/15	141	248	3	670	475	1,396	2	9	17	28	5.6	27	9.4	18.7	51	59
15-1173	Site #5	Middle	6/18/15	138	141	3	807	452	1,403	3	11	14	28	3.6	22	6.2	10.2	50	50
15-1472	Site #5	Middle	7/29/15	121	84	3	1,209	651	1,947	6	8	40	53	3.1	24	7.8	7.7	37	46
15-1740	Site #5	Middle	8/27/15	119	182	3	1,831	811	2,827	17	10	49	76	4.0	37	16.4	60.2	37	76
15-2009	Site #5	Middle	9/22/15	95	366	3	1,715	579	2,663	12	14	63	89	2.9	98	2.6	30.9	30	66
15-2341	Site #5	Middle	10/28/15	122	58	3	1,232	593	1,886	7	15	28	50	2.8	134	4.6	24.6	38	63
15-2555	Site #5	Middle	11/23/15	123	240	3	1,607	568	2,418	4	19	67	90	3.4	267	4.2	136.8	27	88
15-2854	Site #5	Middle	12/15/15	122	154	3	959	680	1,796	8	13	23	44	3.5	101	4.4	19.7	41	60
16-384	Site #5	Middle	2/3/16	113	630	3	1,208	697	2,538	5	15	12	32	3.5	215	4.5	14.1	79	55
16-706	Site #5	Middle	3/10/16	127	53	3	998	638	1,692	3	17	17	37	3.5	94	4.7	24.7	46	63
	Minimum Value:			**95**	**53**	**3**	**670**	**452**	**1,396**	**2**	**3**	**12**	**28**	**2.1**	**22**	**2.1**	**2.9**	**27**	**32**
	Maximum Value:			**141**	**630**	**81**	**1,831**	**965**	**2,827**	**17**	**19**	**67**	**90**	**5.6**	**267**	**16.4**	**136.8**	**79**	**88**
	Arithmetic Value:			**125**	**220**	**12**	**1,147**	**672**	**2,051**	**7**	**11**	**31**	**50**	**3.4**	**90**	**6.0**	**29.8**	**46**	**59**
	Geometric Mean:			**124**	**175**	**5**	**1,087**	**654**	**2,002**	**6**	**10**	**27**	**45**	**3.3**	**63**	**5.2**	**18.2**	**44**	**57**

APPENDIX F

HYDROLOGIC RUNOFF MODELS FOR LAKE YALE AND TROUT LAKE

F.1 Lake Yale
F.2 Trout Lake

F.1 Lake Yale

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Lake Yale	Lake Yale	None	None	0	Citrus Groves	116.673	0.0	43.2	0.009	4.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.39
					LDR	27.650	0.0	56.1	0.024	2.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.72
					MDR	6.285	0.0	48.9	0.014	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
					Pasture	13.494	0.0	49.7	0.015	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84
					Pine Flatwoods	5.217	0.0	30.0	0.002	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
					Recreational	0.214	0.0	39.0	0.006	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
					Shrub and Brushland	13.447	0.0	56.8	0.025	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39
					Transportation	4.116	0.0	68.5	0.053	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90
					Upland Mixed	12.636	0.0	50.1	0.016	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81
					Upland Nonforested	7.445	0.0	45.5	0.011	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
					Wet Prairies	93.220	0.0	73.0	0.071	27.21	0.00	0.00	0.00	0.00	0.00	1.00	27.21	0.00
					Wetlands	75.850	0.0	77.0	0.092	28.84	0.00	0.00	0.00	0.00	0.00	1.00	28.84	0.00
		Swale	None	0	Transportation	7.756	0.0	55.8	0.023	0.75	0.20	0.00	0.15	0.00	0.00	0.00	0.00	0.60
	LYD 0	None	None	0	LDR	5.448	0.0	72.6	0.069	1.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55
					Mobile Homes	0.497	25.0	58.7	0.223	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
					Recreational	0.941	0.0	53.6	0.020	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
					Upland Mixed	20.079	0.0	50.2	0.016	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30
					Upland Nonforested	5.030	0.0	67.9	0.051	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06
					Wet Prairies	3.010	0.0	73.0	0.071	0.88	0.00	0.00	0.00	0.00	0.00	1.00	0.88	0.00
					Wetlands	11.655	0.0	77.0	0.092	4.43	0.00	0.00	0.00	0.00	0.00	1.00	4.43	0.00
	LYD 0-01	None	None	0	Upland Nonforested	1.105	0.0	82.0	0.130	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
LYD 01-01	LYD 01-01	None	None	0	Upland Mixed	1.535	0.0	48.9	0.014	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
					Wet Prairies	0.191	0.0	73.0	0.071	0.06	0.00	0.00	0.00	0.00	0.00	1.00	0.06	0.00
					Wetlands	3.927	0.0	77.0	0.092	1.49	0.00	0.00	0.00	0.00	0.00	1.00	1.49	0.00
	LYD 01-02a	None	None	3	LDR	0.657	0.0	48.5	0.014	0.04	0.00	0.00	0.00	0.50	0.02	0.00	0.00	0.02
					Mobile Homes	7.037	25.0	58.7	0.223	6.51	0.00	0.00	0.00	0.50	3.25	0.00	0.00	3.25
					Pasture	5.998	0.0	61.8	0.035	0.86	0.00	0.00	0.00	0.50	0.43	0.00	0.00	0.43
					Pine Flatwoods	4.933	0.0	77.0	0.092	1.88	0.00	0.00	0.00	0.50	0.94	0.00	0.00	0.94
					Upland Mixed	13.299	0.0	48.3	0.014	0.75	0.00	0.00	0.00	0.50	0.38	0.00	0.00	0.38
					Wet Prairies	6.571	0.0	73.0	0.071	1.92	0.00	0.00	0.00	0.50	0.96	1.00	0.96	0.00
	LYD 01-03a	None	None	3	Golf Course	7.076	0.0	39.0	0.006	0.18	0.00	0.00	0.00	0.50	0.09	0.00	0.00	0.09
					Industrial	2.860	0.0	42.1	0.008	0.10	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
					LDR	0.106	0.0	48.5	0.014	0.01	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
					Mobile Homes	8.553	25.0	58.7	0.223	7.91	0.00	0.00	0.00	0.50	3.96	0.00	0.00	3.96
					Pasture	3.411	0.0	51.7	0.018	0.25	0.00	0.00	0.00	0.50	0.12	0.00	0.00	0.12
					Upland Mixed	5.634	0.0	52.2	0.018	0.43	0.00	0.00	0.00	0.50	0.21	0.00	0.00	0.21
					Wet Prairies	0.827	0.0	73.0	0.071	0.24	0.00	0.00	0.00	0.50	0.12	1.00	0.12	0.00
LYD 02-01	LYD 02-01	None	None	0	Mobile Homes	0.923	25.0	58.7	0.223	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
					Recreational	5.533	0.0	52.4	0.018	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42
	LYD 02-02a	Dry Pond	None	0	Mobile Homes	21.721	25.0	58.7	0.223	20.09	0.80	0.00	16.07	0.00	0.00	0.00	0.00	4.02
					Recreational	0.614	0.0	39.0	0.006	0.02	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.00
					Upland Mixed	0.154	0.0	30.0	0.002	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LYD 02-03a	Dry Pond	Wet Pond	13	Commercial	2.621	22.8	56.4	0.203	2.20	0.80	0.20	1.85	1.00	0.35	0.00	0.00	0.00
		None	None	13	Transportation	0.009	0.0	62.6	0.036	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
		Wet Pond	None	13	Industrial	0.055	0.0	39.0	0.006	0.00	0.20	0.00	0.00	1.00	0.00	0.00	0.00	0.00
					LDR	0.755	0.0	45.8	0.011	0.03	0.20	0.00	0.01	1.00	0.03	0.00	0.00	0.00
					Mobile Homes	71.156	21.8	56.2	0.195	57.49	0.20	0.00	11.50	1.00	45.99	0.00	0.00	0.00
					Transportation	2.213	0.0	62.6	0.036	0.33	0.20	0.00	0.07	1.00	0.27	0.00	0.00	0.00
					Upland Nonforested	0.052	0.0	43.0	0.009	0.00	0.20	0.00	0.00	1.00	0.00	0.00	0.00	0.00
					Xeric Oak	1.928	0.0	30.0	0.002	0.02	0.20	0.00	0.00	1.00	0.01	0.00	0.00	0.00
	LYD 02-04a	None	None	6	Industrial	0.107	0.0	42.7	0.009	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
					LDR	2.164	0.0	45.8	0.011	0.10	0.00	0.00	0.00	0.90	0.09	0.00	0.00	0.01
					Mobile Homes	0.122	25.0	58.7	0.223	0.11	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.01
					Pasture	3.226	0.0	49.0	0.014	0.19	0.00	0.00	0.00	0.90	0.17	0.00	0.00	0.02
					Transportation	1.490	0.0	62.6	0.036	0.22	0.00	0.00	0.00	0.90	0.20	0.00	0.00	0.02
					Upland Nonforested	0.776	0.0	43.0	0.009	0.03	0.00	0.00	0.00	0.90	0.03	0.00	0.00	0.00
					Wet Prairies	1.175	0.0	73.0	0.071	0.34	0.00	0.00	0.00	0.90	0.31	1.00	0.03	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 02-01	LYD 02-05a	None	None	3	Industrial	2.439	0.0	43.4	0.009	0.09	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
					Pasture	4.267	0.0	49.0	0.014	0.25	0.00	0.00	0.00	0.50	0.13	0.00	0.00	0.13
					Upland Nonforested	2.543	0.0	43.0	0.009	0.09	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
	LYD 02-05b	None	None	1	Industrial	1.067	0.0	48.9	0.014	0.06	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.06
					Upland Nonforested	0.066	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
	LYD 02-06a	None	None	1	Industrial	0.529	0.0	39.0	0.006	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Upland Nonforested	2.156	0.0	43.0	0.009	0.08	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.07
	LYD 02-07a	Dry Pond	None	0	LDR	0.489	0.0	48.5	0.014	0.03	0.80	0.00	0.02	0.00	0.00	0.00	0.00	0.01
					Transportation	1.286	0.0	62.6	0.036	0.19	0.80	0.00	0.16	0.00	0.00	0.00	0.00	0.04
					Upland Nonforested	0.805	0.0	43.0	0.009	0.03	0.80	0.00	0.02	0.00	0.00	0.00	0.00	0.01
					Xeric Oak	12.649	0.0	30.0	0.002	0.12	0.80	0.00	0.10	0.00	0.00	0.00	0.00	0.02
	LYD 02-07b	Dry Pond	None	0	Upland Nonforested	1.430	0.0	43.0	0.009	0.05	0.80	0.00	0.04	0.00	0.00	0.00	0.00	0.01
	LYD 02-08a	None	None	1	LDR	10.602	0.0	45.8	0.011	0.49	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.44
					Transportation	0.686	0.0	62.6	0.036	0.10	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.09
	LYD 02-09a	None	None	1	LDR	24.728	0.0	45.8	0.011	1.15	0.00	0.00	0.00	0.10	0.11	0.00	0.00	1.03
					Transportation	0.004	0.0	62.6	0.036	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
LYD 03-01	LYD 03-01	None	None	0	Recreational	2.805	0.0	63.0	0.037	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
					Transportation	0.093	0.0	62.6	0.036	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	LYD 03-02a	Dry Pond	None	0	Mobile Homes	17.855	25.0	58.7	0.223	16.52	0.80	0.00	13.21	0.00	0.00	0.00	0.00	3.30
					Recreational	0.746	0.0	39.0	0.006	0.02	0.80	0.00	0.02	0.00	0.00	0.00	0.00	0.00
					Transportation	0.034	0.0	62.6	0.036	0.01	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LYD 04-01	LYD 04-01	None	None	0	LDR	0.011	0.0	45.8	0.011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Mobile Homes	1.475	25.0	58.7	0.223	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.36
					Pasture	0.044	0.0	49.0	0.014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Transportation	2.273	0.0	62.6	0.036	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
					Upland Nonforested	0.075	0.0	64.6	0.041	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
LYD 05-01	LYD 05-01	None	None	0	Transportation	0.003	0.0	62.6	0.036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	2.000	0.0	82.0	0.130	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08
	LYD 05-02a	Wet Pond	None	0	LDR	0.018	0.0	45.8	0.011	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Pasture	3.842	0.0	49.0	0.014	0.23	0.20	0.00	0.05	0.00	0.00	0.00	0.00	0.18
					Transportation	0.039	0.0	62.6	0.036	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	3.867	0.0	52.0	0.018	0.29	0.20	0.00	0.06	0.00	0.00	0.00	0.00	0.23
LYD 06-01	LYD 06-01	None	None	0	LDR	2.645	0.0	45.8	0.011	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
					Pasture	0.933	0.0	49.0	0.014	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
					Upland Nonforested	8.503	0.0	55.6	0.023	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81
	LYD 06-02a	None	None	3	LDR	4.222	0.0	45.8	0.011	0.20	0.00	0.00	0.00	0.50	0.10	0.00	0.00	0.10
					Pasture	0.466	0.0	49.0	0.014	0.03	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
					Transportation	0.057	0.0	62.6	0.036	0.01	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
					Upland Nonforested	0.212	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
LYD 07-01	LYD 07-01	None	None	0	LDR	7.300	0.0	45.8	0.011	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
					Upland Nonforested	40.638	0.0	50.5	0.016	2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70
					Wetlands	0.285	0.0	77.0	0.092	0.11	0.00	0.00	0.00	0.00	0.00	1.00	0.11	0.00
	LYD 07-02a	None	None	5	LDR	3.441	0.0	45.8	0.011	0.16	0.00	0.00	0.00	0.80	0.13	0.00	0.00	0.03
					Upland Nonforested	18.259	0.0	43.0	0.009	0.68	0.00	0.00	0.00	0.80	0.54	0.00	0.00	0.14
LYD 07b-01	LYD 07b-01	None	None	2	Citrus Groves	24.110	0.0	43.4	0.009	0.92	0.00	0.00	0.00	0.25	0.23	0.00	0.00	0.69
					LDR	0.213	0.0	59.9	0.030	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					Pasture	18.225	0.0	53.6	0.020	1.51	0.00	0.00	0.00	0.25	0.38	0.00	0.00	1.13
					Recreational	0.016	0.0	39.0	0.006	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Wetlands	26.822	0.0	77.0	0.092	10.20	0.00	0.00	0.00	0.25	2.55	1.00	7.65	0.00
LYD 08-01	LYD 08-01	None	None	0	Citrus Groves	2.161	0.0	43.0	0.009	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
					LDR	2.544	0.0	68.3	0.052	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55
	LYD 08-02a	None	None	5	Citrus Groves	15.066	0.0	43.2	0.009	0.57	0.00	0.00	0.00	0.80	0.45	0.00	0.00	0.11
					LDR	0.571	0.0	65.3	0.043	0.10	0.00	0.00	0.00	0.80	0.08	0.00	0.00	0.02
					Wet Prairies	2.223	0.0	73.0	0.071	0.65	0.00	0.00	0.00	0.80	0.52	1.00	0.13	0.00
	LYD 08-03a	None	None	3	Citrus Groves	8.692	0.0	43.0	0.009	0.32	0.00	0.00	0.00	0.50	0.16	0.00	0.00	0.16
					Upland Hardwood	0.877	0.0	32.1	0.003	0.01	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
	LYD 08-04a	None	None	1	Citrus Groves	10.095	0.0	43.0	0.009	0.38	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.34

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 08-01	LYD 08-04a	None	None	1	Upland Nonforested	0.091	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
LYD 09-01	LYD 09-01	None	None	0	Pasture	16.156	0.0	84.0	0.150	10.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.03
					Pine Flatwoods	4.962	0.0	77.0	0.092	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.89
					Upland Mixed	46.718	0.0	77.0	0.092	17.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.76
					Upland Nonforested	4.552	0.0	82.0	0.130	2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.46
					Wet Prairies	46.513	0.0	73.0	0.071	13.58	0.00	0.00	0.00	0.00	0.00	1.00	13.58	0.00
					Wetlands	15.270	0.0	77.0	0.092	5.81	0.00	0.00	0.00	0.00	0.00	1.00	5.81	0.00
	LYD 09-02a	None	None	2	Pasture	0.880	0.0	84.0	0.150	0.55	0.00	0.00	0.00	0.25	0.14	0.00	0.00	0.41
					Upland Mixed	15.514	0.0	77.0	0.092	5.90	0.00	0.00	0.00	0.25	1.47	0.00	0.00	4.42
					Wet Prairies	1.485	0.0	73.0	0.071	0.43	0.00	0.00	0.00	0.25	0.11	1.00	0.33	0.00
LYD 10-01	LYD 10-01	None	None	0	Pine Flatwoods	2.022	0.0	77.0	0.092	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77
					Upland Mixed	14.376	0.0	77.0	0.092	5.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.47
					Upland Nonforested	9.335	0.0	82.0	0.130	5.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.04
					Wet Prairies	12.839	0.0	73.0	0.071	3.75	0.00	0.00	0.00	0.00	0.00	1.00	3.75	0.00
LYD 11-01	LYD 11-01	None	None	0	LDR	1.602	0.0	80.9	0.120	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79
					Pasture	40.666	0.0	84.0	0.150	25.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.24
					Upland Hardwood	6.894	0.0	77.0	0.092	2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.62
					Upland Mixed	22.659	0.0	77.0	0.092	8.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.62
					Wet Prairies	112.940	0.0	73.0	0.071	32.97	0.00	0.00	0.00	0.00	0.00	1.00	32.97	0.00
					Wetlands	16.621	0.0	77.0	0.092	6.32	0.00	0.00	0.00	0.00	0.00	1.00	6.32	0.00
	LYD 11-02a	None	None	0	LDR	1.929	0.0	80.9	0.120	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96
					Pasture	49.653	0.0	84.0	0.150	30.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.82
					Upland Hardwood	0.535	0.0	77.0	0.092	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
					Upland Mixed	24.048	0.0	77.0	0.092	9.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.14
					Upland Nonforested	12.146	0.0	82.0	0.130	6.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.56
					Wet Prairies	20.666	0.0	73.0	0.071	6.03	0.00	0.00	0.00	0.00	0.00	1.00	6.03	0.00
	LYD 11-02b	None	None	2	Pasture	26.521	0.0	77.4	0.095	10.39	0.00	0.00	0.00	0.25	2.60	0.00	0.00	7.80
					Upland Mixed	1.632	0.0	77.0	0.092	0.62	0.00	0.00	0.00	0.25	0.16	0.00	0.00	0.47
					Wet Prairies	8.901	0.0	73.0	0.071	2.60	0.00	0.00	0.00	0.25	0.65	1.00	1.95	0.00
					Wetlands	13.250	0.0	77.0	0.092	5.04	0.00	0.00	0.00	0.25	1.26	1.00	3.78	0.00
	LYD 11-02c	None	None	0	Pasture	14.752	0.0	84.0	0.150	9.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.16
					Upland Nonforested	1.593	0.0	82.0	0.130	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86
					Wet Prairies	0.436	0.0	73.0	0.071	0.13	0.00	0.00	0.00	0.00	0.00	1.00	0.13	0.00
					Wetlands	1.001	0.0	77.0	0.092	0.38	0.00	0.00	0.00	0.00	0.00	1.00	0.38	0.00
	LYD 11-02d	None	None	2	Pasture	11.012	0.0	84.0	0.150	6.83	0.00	0.00	0.00	0.25	1.71	0.00	0.00	5.13
					Upland Nonforested	1.849	0.0	82.0	0.130	1.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.75
					Wet Prairies	1.574	0.0	73.0	0.071	0.46	0.00	0.00	0.00	0.25	0.11	1.00	0.34	0.00
	LYD 11-02e	None	None	1	LDR	2.499	0.0	80.9	0.120	1.24	0.00	0.00	0.00	0.10	0.12	0.00	0.00	1.11
					Pasture	1.737	0.0	84.0	0.150	1.08	0.00	0.00	0.00	0.10	0.11	0.00	0.00	0.97
					Upland Hardwood	0.884	0.0	77.0	0.092	0.34	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.30
	LYD 11-02f	None	None	1	Pasture	2.653	0.0	84.0	0.150	1.65	0.00	0.00	0.00	0.10	0.16	0.00	0.00	1.48
					Upland Mixed	0.675	0.0	77.0	0.092	0.26	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.23
	LYD 11-03a	None	None	2	Pasture	13.653	0.0	78.8	0.103	5.84	0.00	0.00	0.00	0.25	1.46	0.00	0.00	4.38
					Pine Flatwoods	45.182	0.0	77.0	0.092	17.18	0.00	0.00	0.00	0.25	4.30	0.00	0.00	12.89
					Upland Nonforested	37.289	0.0	82.0	0.130	20.13	0.00	0.00	0.00	0.25	5.03	0.00	0.00	15.10
					Wet Prairies	2.263	0.0	73.0	0.071	0.66	0.00	0.00	0.00	0.25	0.17	1.00	0.50	0.00
					Wetlands	24.651	0.0	77.0	0.092	9.37	0.00	0.00	0.00	0.25	2.34	1.00	7.03	0.00
	LYD 11-03b	None	None	0	MDR	3.645	0.0	65.4	0.043	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
					Pasture	35.382	0.0	84.0	0.150	21.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.96
					Upland Mixed	5.566	0.0	77.0	0.092	2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.12
					Wet Prairies	1.192	0.0	73.0	0.071	0.35	0.00	0.00	0.00	0.00	0.00	1.00	0.35	0.00
	LYD 11-03c	None	None	2	MDR	0.085	0.0	68.4	0.053	0.02	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Pasture	15.863	0.0	84.0	0.150	9.85	0.00	0.00	0.00	0.25	2.46	0.00	0.00	7.38
					Upland Mixed	0.018	0.0	77.0	0.092	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
	LYD 11-03d	None	None	0	Pasture	11.130	0.0	84.0	0.150	6.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.91
					Wet Prairies	0.413	0.0	73.0	0.071	0.12	0.00	0.00	0.00	0.00	0.00	1.00	0.12	0.00
					Wetlands	0.079	0.0	77.0	0.092	0.03	0.00	0.00	0.00	0.00	0.00	1.00	0.03	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 11-01	LYD 11-03e	None	None	1	Pasture	1.369	0.0	84.0	0.150	0.85	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.76
					Upland Hardwood	0.363	0.0	77.0	0.092	0.14	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.12
					Wet Prairies	0.978	0.0	73.0	0.071	0.29	0.00	0.00	0.00	0.10	0.03	1.00	0.26	0.00
	LYD 11-03f	None	None	1	Pasture	1.097	0.0	84.0	0.150	0.68	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.61
					Upland Nonforested	0.320	0.0	82.0	0.130	0.17	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.16
					Wet Prairies	0.692	0.0	73.0	0.071	0.20	0.00	0.00	0.00	0.10	0.02	1.00	0.18	0.00
	LYD 11-04a	None	None	1	MDR	6.243	0.0	64.8	0.042	1.07	0.00	0.00	0.00	0.10	0.11	0.00	0.00	0.97
					Pasture	12.587	0.0	84.0	0.150	7.81	0.00	0.00	0.00	0.10	0.78	0.00	0.00	7.03
					Upland Mixed	3.964	0.0	77.0	0.092	1.51	0.00	0.00	0.00	0.10	0.15	0.00	0.00	1.36
					Wet Prairies	6.376	0.0	73.0	0.071	1.86	0.00	0.00	0.00	0.10	0.19	1.00	1.67	0.00
					Wetlands	0.995	0.0	77.0	0.092	0.38	0.00	0.00	0.00	0.10	0.04	1.00	0.34	0.00
LYD 12-01	LYD 12-01	None	None	0	LDR	0.365	0.0	70.0	0.057	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
					Mobile Homes	13.958	0.0	79.5	0.108	6.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.23
					Pasture	28.082	0.0	84.0	0.150	17.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.43
					Pine Flatwoods	4.266	0.0	76.3	0.087	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.54
					Upland Mixed	18.440	0.0	77.0	0.092	7.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.01
					Upland Nonforested	2.953	0.0	79.3	0.106	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30
					Wet Prairies	81.413	0.0	73.0	0.071	23.76	0.00	0.00	0.00	0.00	0.00	1.00	23.76	0.00
					Wetlands	1.058	0.0	77.0	0.092	0.40	0.00	0.00	0.00	0.00	0.00	1.00	0.40	0.00
	LYD 12-02a	None	None	1	Pasture	1.624	0.0	84.0	0.150	1.01	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.91
					Upland Nonforested	0.931	0.0	82.0	0.130	0.50	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.45
					Wet Prairies	0.848	0.0	73.0	0.071	0.25	0.00	0.00	0.00	0.10	0.02	1.00	0.22	0.00
	LYD 12-02b	None	None	2	Pasture	8.177	0.0	84.0	0.150	5.07	0.00	0.00	0.00	0.25	1.27	0.00	0.00	3.81
	LYD 12-02c	None	None	1	Citrus Groves	7.153	0.0	48.5	0.014	0.41	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.37
					Mobile Homes	1.395	0.0	79.5	0.108	0.62	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.56
					Pasture	53.547	0.0	84.0	0.150	33.23	0.00	0.00	0.00	0.10	3.32	0.00	0.00	29.91
					Upland Mixed	4.166	0.0	77.0	0.092	1.58	0.00	0.00	0.00	0.10	0.16	0.00	0.00	1.43
					Wet Prairies	14.702	0.0	73.0	0.071	4.29	0.00	0.00	0.00	0.10	0.43	1.00	3.86	0.00
	LYD 12-03a	None	None	1	Pasture	65.155	0.0	84.0	0.150	40.44	0.00	0.00	0.00	0.10	4.04	0.00	0.00	36.39
					Upland Mixed	1.490	0.0	77.0	0.092	0.57	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.51
					Upland Nonforested	1.194	0.0	82.0	0.130	0.64	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.58
	LYD 12-03b	None	None	2	Pasture	6.822	0.0	84.0	0.150	4.23	0.00	0.00	0.00	0.25	1.06	0.00	0.00	3.18
					Wet Prairies	1.542	0.0	73.0	0.071	0.45	0.00	0.00	0.00	0.25	0.11	1.00	0.34	0.00
	LYD 12-04a	None	None	0	Citrus Groves	4.817	0.0	64.9	0.042	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83
					Industrial	0.288	0.0	61.0	0.033	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
					MDR	19.202	0.0	56.3	0.024	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92
					Transportation	0.860	0.0	69.8	0.057	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
					Upland Mixed	2.896	0.0	77.0	0.092	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10
					Upland Nonforested	1.165	0.0	82.0	0.130	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
	LYD 12-04b	None	None	0	Citrus Groves	0.568	0.0	62.7	0.037	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
					MDR	2.511	0.0	61.1	0.033	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
		Wet Pond	None	0	Industrial	6.752	29.7	75.3	0.297	8.31	0.20	0.00	1.66	0.00	0.00	0.00	0.00	6.65
					Pasture	1.233	0.0	84.0	0.150	0.77	0.20	0.00	0.15	0.00	0.00	0.00	0.00	0.61
					Upland Nonforested	0.919	0.0	82.0	0.130	0.50	0.20	0.00	0.10	0.00	0.00	0.00	0.00	0.40
	LYD 12-04c	None	None	0	Pasture	4.199	0.0	84.0	0.150	2.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.61
					Wet Prairies	0.805	0.0	73.0	0.071	0.23	0.00	0.00	0.00	0.00	0.00	1.00	0.23	0.00
					Wetlands	0.058	0.0	77.0	0.092	0.02	0.00	0.00	0.00	0.00	0.00	1.00	0.02	0.00
	LYD 12-05a	None	None	0	LDR	9.864	0.0	80.9	0.120	4.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.89
					Pasture	9.119	0.0	84.0	0.150	5.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.66
					Upland Mixed	0.516	0.0	77.0	0.092	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
					Wetlands	0.220	0.0	77.0	0.092	0.08	0.00	0.00	0.00	0.00	0.00	1.00	0.08	0.00
LYD 13-01	LYD 13-01	None	None	0	LDR	0.413	0.0	71.2	0.063	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
					Mobile Homes	0.483	0.2	80.3	0.115	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23
					Transportation	0.114	0.0	71.5	0.064	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
					Upland Nonforested	1.798	0.0	82.0	0.130	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97
					Wetlands	30.502	0.0	77.0	0.092	11.60	0.00	0.00	0.00	0.00	0.00	1.00	11.60	0.00
	LYD 13-02a	None	None	0	Citrus Groves	6.612	0.0	54.1	0.021	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 13-01	**LYD 13-02a**	None	**None**	0	**Mobile Homes**	9.008	**1.6**	80.8	**0.130**	4.86	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	4.86
					Pasture	5.173	**0.0**	78.6	**0.102**	2.19	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.19
					Transportation	0.001	**0.0**	71.5	**0.064**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	0.506	**0.0**	77.0	**0.092**	0.19	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.19
					Upland Nonforested	1.889	**0.0**	82.0	**0.130**	1.02	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.02
					Wet Prairies	15.481	**0.0**	73.0	**0.071**	4.52	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**4.52**	0.00
					Wetlands	16.393	**0.0**	77.0	**0.092**	6.23	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**6.23**	0.00
	LYD 13-02b	None	**None**	0	**Transportation**	0.722	**0.0**	71.5	**0.064**	0.19	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.19
					Upland Nonforested	0.204	**0.0**	82.0	**0.130**	0.11	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.11
					Wetlands	5.969	**0.0**	77.0	**0.092**	2.27	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**2.27**	0.00
	LYD 13-03a	None	**None**	0	**Institutional**	1.769	**0.0**	81.6	**0.126**	0.92	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.92
					LDR	0.929	**0.0**	56.2	**0.024**	0.09	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.09
					MDR	1.988	**0.0**	54.6	**0.021**	0.18	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.18
					Mobile Homes	5.261	**0.0**	78.9	**0.104**	2.26	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.26
					Pasture	0.693	**0.0**	60.1	**0.031**	0.09	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.09
					Upland Mixed	2.048	**0.0**	76.7	**0.090**	0.76	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.76
					Upland Nonforested	3.445	**0.0**	78.7	**0.103**	1.47	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.47
					Wetlands	1.726	**0.0**	77.0	**0.092**	0.66	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**0.66**	0.00
		Swale	**None**	0	**Transportation**	1.392	**0.0**	67.3	**0.049**	0.28	**0.20**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.23
		Wet Pond	**None**	0	**Mobile Homes**	14.642	**23.3**	75.7	**0.253**	15.31	**0.20**	0.00	**3.06**	0.00	**0.00**	0.00	**0.00**	12.25
	LYD 13-03b	Wet Pond	**None**	0	**Mobile Homes**	6.752	**10.0**	85.0	**0.225**	6.30	**0.20**	0.00	**1.26**	0.00	**0.00**	0.00	**0.00**	5.04
					Transportation	0.265	**0.0**	81.8	**0.128**	0.14	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.11
					Wetlands	0.984	**0.0**	77.0	**0.092**	0.37	**0.20**	0.00	**0.07**	0.00	**0.00**	1.00	**0.30**	0.00
	LYD 13-03c	Wet Pond	**None**	0	**Mobile Homes**	7.728	**10.0**	85.7	**0.235**	7.51	**0.20**	0.00	**1.50**	0.00	**0.00**	0.00	**0.00**	6.01
					Transportation	0.261	**0.0**	85.1	**0.162**	0.17	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.14
					Wetlands	0.009	**0.0**	77.0	**0.092**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	1.00	**0.00**	0.00
	LYD 13-03d	Swale	**None**	0	**Transportation**	0.893	**0.0**	83.9	**0.149**	0.55	**0.20**	0.00	**0.11**	0.00	**0.00**	0.00	**0.00**	0.44
		Wet Pond	**None**	0	**Mobile Homes**	5.236	**10.0**	85.2	**0.227**	4.93	**0.20**	0.00	**0.99**	0.00	**0.00**	0.00	**0.00**	3.94
					Upland Nonforested	0.546	**0.0**	82.0	**0.130**	0.29	**0.20**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.24
	LYD 13-03e	Wet Pond	**None**	0	**Institutional**	0.141	**0.0**	83.7	**0.147**	0.09	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.07
					Mobile Homes	5.478	**10.0**	87.5	**0.261**	5.92	**0.20**	0.00	**1.18**	0.00	**0.00**	0.00	**0.00**	4.74
					Transportation	0.062	**0.0**	85.1	**0.162**	0.04	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.03
					Upland Nonforested	2.138	**0.0**	82.0	**0.130**	1.15	**0.20**	0.00	**0.23**	0.00	**0.00**	0.00	**0.00**	0.92
					Wetlands	0.694	**0.0**	77.0	**0.092**	0.26	**0.20**	0.00	**0.05**	0.00	**0.00**	1.00	**0.21**	0.00
	LYD 13-04a	Wet Pond	**None**	0	**LDR**	0.149	**0.0**	45.8	**0.011**	0.01	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
					Mobile Homes	11.913	**23.3**	67.3	**0.226**	11.15	**0.20**	0.00	**2.23**	0.00	**0.00**	0.00	**0.00**	8.92
					Upland Mixed	0.032	**0.0**	49.4	**0.015**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.056	**0.0**	82.0	**0.130**	0.03	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.02
	LYD 13-04b	Wet Pond	**None**	0	**Mobile Homes**	4.382	**19.5**	73.8	**0.218**	3.95	**0.20**	0.00	**0.79**	0.00	**0.00**	0.00	**0.00**	3.16
	LYD 13-04c	Wet Pond	**None**	0	**Mobile Homes**	14.627	**19.0**	81.5	**0.256**	15.47	**0.20**	0.00	**3.09**	0.00	**0.00**	0.00	**0.00**	12.38
					Transportation	0.061	**0.0**	64.2	**0.040**	0.01	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
	LYD 13-04d	Wet Pond	**None**	0	**Institutional**	0.002	**0.0**	61.0	**0.033**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Mobile Homes	14.929	**0.0**	80.4	**0.115**	7.12	**0.20**	0.00	**1.42**	0.00	**0.00**	0.00	**0.00**	5.70
	LYD 13-04e	Wet Pond	**None**	0	**Institutional**	8.705	**0.0**	79.8	**0.110**	3.95	**0.20**	0.00	**0.79**	0.00	**0.00**	0.00	**0.00**	3.16
					Mobile Homes	0.987	**0.0**	72.3	**0.067**	0.27	**0.20**	0.00	**0.05**	0.00	**0.00**	0.00	**0.00**	0.22
					Upland Nonforested	6.176	**0.0**	82.0	**0.130**	3.33	**0.20**	0.00	**0.67**	0.00	**0.00**	0.00	**0.00**	2.67
	LYD 13-04f	None	**None**	1	**Citrus Groves**	3.747	**0.0**	43.0	**0.009**	0.14	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.13
					Mobile Homes	0.767	**0.0**	67.8	**0.051**	0.16	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15
					Pasture	7.370	**0.0**	62.3	**0.036**	1.09	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.98
					Upland Mixed	0.691	**0.0**	77.0	**0.092**	0.26	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.24
					Upland Nonforested	2.378	**0.0**	82.0	**0.130**	1.28	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.16
					Wetlands	1.227	**0.0**	77.0	**0.092**	0.47	**0.00**	0.00	**0.00**	0.10	**0.05**	1.00	**0.42**	0.00
	LYD 13-04g	None	**None**	1	**MDR**	0.608	**0.0**	70.0	**0.057**	0.14	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.13
					Pine Flatwoods	6.393	**0.0**	77.0	**0.092**	2.43	**0.00**	0.00	**0.00**	0.10	**0.24**	0.00	**0.00**	2.19
					Upland Mixed	0.138	**0.0**	77.0	**0.092**	0.05	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.05
					Upland Nonforested	2.444	**0.0**	81.2	**0.122**	1.24	**0.00**	0.00	**0.00**	0.10	**0.12**	0.00	**0.00**	1.11
		Swale	**None**	1	**Transportation**	1.062	**0.0**	72.2	**0.067**	0.30	**0.20**	0.00	**0.06**	0.10	**0.02**	0.00	**0.00**	0.21

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 13-01	LYD 13-04h	Swale	None	1	Industrial	1.118	0.2	86.1	0.179	0.83	0.20	0.00	0.17	0.10	0.07	0.00	0.00	0.60
					Mobile Homes	0.001	10.0	88.0	0.269	0.00	0.20	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Transportation	1.572	0.0	83.9	0.149	0.97	0.20	0.00	0.19	0.10	0.08	0.00	0.00	0.70
					Upland Nonforested	2.211	0.0	79.4	0.107	0.98	0.20	0.00	0.20	0.10	0.08	0.00	0.00	0.70
					Wetlands	9.182	0.0	77.0	0.092	3.49	0.20	0.00	0.70	0.10	0.28	1.00	2.51	0.00
	LYD 13-04i	Swale	None	1	Transportation	0.951	0.0	85.7	0.171	0.67	0.20	0.00	0.13	0.10	0.05	0.00	0.00	0.49
		Wet Pond	None	1	Institutional	0.661	0.0	93.4	0.352	0.96	0.20	0.00	0.19	0.10	0.08	0.00	0.00	0.69
					Upland Nonforested	1.361	0.0	82.0	0.130	0.73	0.20	0.00	0.15	0.10	0.06	0.00	0.00	0.53
					Wetlands	0.173	0.0	77.0	0.092	0.07	0.20	0.00	0.01	0.10	0.01	1.00	0.05	0.00
	LYD 13-05a	None	None	1	Citrus Groves	0.393	0.0	44.0	0.010	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					LDR	4.266	0.0	60.0	0.030	0.54	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.48
					Mobile Homes	0.272	16.8	50.9	0.150	0.17	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.15
					Pasture	3.924	0.0	69.5	0.056	0.91	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.82
					Wetlands	0.009	0.0	77.0	0.092	0.00	0.00	0.00	0.00	0.10	0.00	1.00	0.00	0.00
	LYD 13-05b	None	None	2	MDR	2.808	0.0	55.9	0.023	0.27	0.00	0.00	0.00	0.25	0.07	0.00	0.00	0.20
					Pine Flatwoods	0.653	0.0	39.8	0.007	0.02	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Transportation	0.330	0.0	56.5	0.024	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.03
					Upland Mixed	4.105	0.0	52.3	0.018	0.31	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.23
					Upland Nonforested	1.823	0.0	58.9	0.029	0.22	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.16
	LYD 13-05c	None	None	1	Commercial	0.500	14.7	77.9	0.202	0.42	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.38
					MDR	0.493	0.0	70.3	0.059	0.12	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.11
					Pine Flatwoods	2.950	0.0	77.0	0.092	1.12	0.00	0.00	0.00	0.10	0.11	0.00	0.00	1.01
	LYD 13-05d	Swale	None	1	MDR	4.844	13.5	59.1	0.134	2.69	0.20	0.00	0.54	0.10	0.22	0.00	0.00	1.94
					Mobile Homes	0.204	24.6	73.2	0.253	0.21	0.20	0.00	0.04	0.10	0.02	0.00	0.00	0.15
					Transportation	3.252	0.0	72.9	0.070	0.94	0.20	0.00	0.19	0.10	0.08	0.00	0.00	0.68
	LYD 13-05e	None	None	2	Industrial	4.798	0.0	64.1	0.040	0.79	0.00	0.00	0.00	0.25	0.20	0.00	0.00	0.59
					Upland Nonforested	0.188	0.0	82.0	0.130	0.10	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.08
					Wet Prairies	1.143	0.0	73.0	0.071	0.33	0.00	0.00	0.00	0.25	0.08	1.00	0.25	0.00
					Wetlands	11.316	0.0	77.0	0.092	4.30	0.00	0.00	0.00	0.25	1.08	1.00	3.23	0.00
	LYD 13-05f	Swale	None	0	Industrial	2.280	0.0	76.1	0.086	0.81	0.20	0.00	0.16	0.00	0.00	0.00	0.00	0.65
					Transportation	0.918	0.0	85.1	0.162	0.61	0.20	0.00	0.12	0.00	0.00	0.00	0.00	0.49
	LYD 13-05g	Swale	None	0	Commercial	1.085	0.0	83.1	0.141	0.63	0.20	0.00	0.13	0.00	0.00	0.00	0.00	0.51
					Institutional	0.398	0.0	98.0	0.595	0.98	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.78
					Transportation	1.744	0.0	83.0	0.140	1.01	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.81
					Upland Nonforested	4.379	0.0	81.9	0.129	2.34	0.20	0.00	0.47	0.00	0.00	0.00	0.00	1.87
					Wetlands	0.173	0.0	77.0	0.092	0.07	0.20	0.00	0.01	0.00	0.00	1.00	0.05	0.00
	LYD 13-06a	None	None	1	Mobile Homes	0.190	0.0	39.1	0.006	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Pasture	0.874	0.0	70.3	0.059	0.21	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.19
					Recreational	2.066	0.0	47.4	0.013	0.11	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.10
					Upland Mixed	0.489	0.0	69.8	0.057	0.12	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.10
					Wet Prairies	1.026	0.0	73.0	0.071	0.30	0.00	0.00	0.00	0.10	0.03	1.00	0.27	0.00
					Wetlands	3.597	0.0	77.0	0.092	1.37	0.00	0.00	0.00	0.10	0.14	1.00	1.23	0.00
	LYD 13-06b	None	None	0	MDR	0.252	0.0	64.8	0.041	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
					Pine Flatwoods	1.326	0.0	53.8	0.020	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
					Transportation	0.090	0.0	56.3	0.024	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
		Wet Pond	None	0	Commercial	2.997	56.4	79.3	0.503	6.24	0.20	0.00	1.25	0.00	0.00	0.00	0.00	4.99
	LYD 13-06c	Wet Pond	None	0	MDR	12.744	18.9	69.6	0.199	10.47	0.20	0.00	2.09	0.00	0.00	0.00	0.00	8.38
	LYD 13-06d	Swale	None	0	MDR	1.309	12.5	47.4	0.112	0.61	0.20	0.00	0.12	0.00	0.00	0.00	0.00	0.49
					Mobile Homes	4.864	0.0	62.4	0.036	0.72	0.20	0.00	0.14	0.00	0.00	0.00	0.00	0.58
					Transportation	2.059	0.0	74.3	0.076	0.65	0.20	0.00	0.13	0.00	0.00	0.00	0.00	0.52
	LYD 13-06e	Swale	None	0	Institutional	1.635	0.0	80.4	0.115	0.78	0.20	0.00	0.16	0.00	0.00	0.00	0.00	0.62
					Mobile Homes	6.126	0.0	72.4	0.068	1.72	0.20	0.00	0.34	0.00	0.00	0.00	0.00	1.38
					Transportation	1.150	0.0	71.0	0.062	0.30	0.20	0.00	0.06	0.00	0.00	0.00	0.00	0.24
					Upland Nonforested	1.423	0.0	71.8	0.065	0.39	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.31
	LYD 13-06f	Swale	None	0	Commercial	1.783	0.0	80.0	0.111	0.82	0.20	0.00	0.16	0.00	0.00	0.00	0.00	0.66
					Industrial	7.389	0.0	71.4	0.064	1.94	0.20	0.00	0.39	0.00	0.00	0.00	0.00	1.56
					LDR	0.956	0.0	68.7	0.053	0.21	0.20	0.00	0.04	0.00	0.00	0.00	0.00	0.17

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 13-01	LYD 13-06f	Swale	None	0	Transportation	2.545	0.0	78.9	0.104	1.09	0.20	0.00	0.22	0.00	0.00	0.00	0.00	0.87
					Upland Mixed	2.359	0.0	69.1	0.055	0.54	0.20	0.00	0.11	0.00	0.00	0.00	0.00	0.43
					Upland Nonforested	1.519	0.0	70.6	0.060	0.38	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.30
	LYD 13-07a	None	None	1	Citrus Groves	1.426	0.0	62.0	0.035	0.21	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.19
					Commercial	0.138	0.0	77.5	0.095	0.05	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.05
					LDR	1.655	0.0	81.9	0.130	0.89	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.80
					Pasture	23.321	0.0	82.2	0.132	12.79	0.00	0.00	0.00	0.10	1.28	0.00	0.00	11.51
					Recreational	3.865	0.0	48.8	0.014	0.23	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.20
					Upland Mixed	5.918	0.0	59.1	0.029	0.71	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.64
					Wet Prairies	8.581	0.0	73.0	0.071	2.50	0.00	0.00	0.00	0.10	0.25	1.00	2.25	0.00
					Wetlands	13.007	0.0	77.0	0.092	4.95	0.00	0.00	0.00	0.10	0.49	1.00	4.45	0.00
	LYD 13-07b	Wet Pond	None	0	LDR	0.681	0.0	51.3	0.017	0.05	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.04
					MDR	0.645	0.0	55.2	0.022	0.06	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.05
					Mobile Homes	0.714	23.9	71.3	0.241	0.71	0.20	0.00	0.14	0.00	0.00	0.00	0.00	0.57
					Recreational	1.916	0.0	47.2	0.013	0.10	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.08
					Upland Mixed	0.224	0.0	60.4	0.031	0.03	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.02
					Upland Nonforested	3.072	0.0	60.0	0.030	0.39	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.31
					Wet Prairies	0.284	0.0	73.0	0.071	0.08	0.20	0.00	0.02	0.00	0.00	1.00	0.07	0.00
					Wetlands	0.136	0.0	77.0	0.092	0.05	0.20	0.00	0.01	0.00	0.00	1.00	0.04	0.00
	LYD 13-07c	Wet Pond	None	0	MDR	0.294	12.5	47.4	0.112	0.14	0.20	0.00	0.03	0.00	0.00	0.00	0.00	0.11
					Mobile Homes	4.474	0.0	65.3	0.043	0.80	0.20	0.00	0.16	0.00	0.00	0.00	0.00	0.64
					Transportation	0.079	0.0	62.0	0.035	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.01
					Upland Hardwood	0.585	0.0	38.2	0.006	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	LYD 13-08a	Swale	None	2	LDR	0.299	0.0	51.3	0.017	0.02	0.20	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Pasture	18.765	0.0	77.1	0.092	7.16	0.20	0.00	1.43	0.25	1.43	0.00	0.00	4.30
					Recreational	6.937	0.0	48.1	0.014	0.39	0.20	0.00	0.08	0.25	0.08	0.00	0.00	0.23
					Transportation	3.424	0.0	65.8	0.044	0.63	0.20	0.00	0.13	0.25	0.13	0.00	0.00	0.38
					Upland Mixed	1.137	0.0	55.0	0.022	0.10	0.20	0.00	0.02	0.25	0.02	0.00	0.00	0.06
		Wet Pond	None	2	Commercial	0.972	0.0	74.3	0.076	0.31	0.20	0.00	0.06	0.25	0.06	0.00	0.00	0.18
	LYD 13-09a	Dry Pond	None	2	Industrial	2.401	0.0	75.1	0.080	0.79	0.80	0.00	0.63	0.25	0.04	0.00	0.00	0.12
					LDR	0.092	0.0	81.4	0.124	0.05	0.80	0.00	0.04	0.25	0.00	0.00	0.00	0.01
					Upland Nonforested	1.052	0.0	82.0	0.130	0.57	0.80	0.00	0.45	0.25	0.03	0.00	0.00	0.09
		None	None	2	Industrial	3.458	0.0	64.1	0.040	0.57	0.00	0.00	0.00	0.25	0.14	0.00	0.00	0.43
					LDR	8.863	0.0	81.4	0.124	4.55	0.00	0.00	0.00	0.25	1.14	0.00	0.00	3.41
					MDR	10.983	0.0	76.4	0.088	4.00	0.00	0.00	0.00	0.25	1.00	0.00	0.00	3.00
					Wet Prairies	1.472	0.0	73.0	0.071	0.43	0.00	0.00	0.00	0.25	0.11	1.00	0.32	0.00
					Wetlands	27.521	0.0	77.0	0.092	10.46	0.00	0.00	0.00	0.25	2.62	1.00	7.85	0.00
		Swale	None	2	Transportation	7.368	0.0	71.6	0.065	1.97	0.20	0.00	0.39	0.25	0.39	0.00	0.00	1.18
	LYD 13-09b	Swale	None	0	Commercial	0.463	18.8	66.2	0.189	0.36	0.20	0.00	0.07	0.00	0.00	0.00	0.00	0.29
					Transportation	2.282	0.0	77.5	0.095	0.90	0.20	0.00	0.18	0.00	0.00	0.00	0.00	0.72
					Upland Nonforested	0.068	0.0	43.0	0.009	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LYD 13-10a	Dry Pond	None	3	Industrial	1.180	0.0	61.6	0.034	0.17	0.80	0.00	0.13	0.50	0.02	0.00	0.00	0.02
					LDR	0.046	0.0	81.4	0.124	0.02	0.80	0.00	0.02	0.50	0.00	0.00	0.00	0.00
					Upland Mixed	0.073	0.0	77.0	0.092	0.03	0.80	0.00	0.02	0.50	0.00	0.00	0.00	0.00
					Upland Nonforested	0.086	0.0	82.0	0.130	0.05	0.80	0.00	0.04	0.50	0.00	0.00	0.00	0.00
		None	None	3	LDR	19.026	0.0	77.8	0.097	7.65	0.00	0.00	0.00	0.50	3.83	0.00	0.00	3.83
					Pine Flatwoods	1.922	0.0	77.0	0.092	0.73	0.00	0.00	0.00	0.50	0.37	0.00	0.00	0.37
					Shrub and Brushland	1.125	0.0	53.3	0.020	0.09	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
					Upland Mixed	6.889	0.0	49.9	0.015	0.43	0.00	0.00	0.00	0.50	0.22	0.00	0.00	0.22
					Upland Nonforested	2.079	0.0	68.8	0.054	0.46	0.00	0.00	0.00	0.50	0.23	0.00	0.00	0.23
					Wetlands	16.750	0.0	77.0	0.092	6.37	0.00	0.00	0.00	0.50	3.18	1.00	3.18	0.00
	LYD 13-10b	None	None	2	LDR	4.488	0.0	81.4	0.124	2.30	0.00	0.00	0.00	0.25	0.58	0.00	0.00	1.73
					Wet Prairies	3.522	0.0	73.0	0.071	1.03	0.00	0.00	0.00	0.25	0.26	1.00	0.77	0.00
					Wetlands	6.559	0.0	77.0	0.092	2.49	0.00	0.00	0.00	0.25	0.62	1.00	1.87	0.00
	LYD 13-10c	Swale	None	1	Commercial	0.062	39.8	81.3	0.397	0.10	0.20	0.00	0.02	0.10	0.01	0.00	0.00	0.07
					MDR	0.953	0.0	53.8	0.020	0.08	0.20	0.00	0.02	0.10	0.01	0.00	0.00	0.06
					Transportation	3.502	0.0	76.1	0.086	1.25	0.20	0.00	0.25	0.10	0.10	0.00	0.00	0.90

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 13-01	**LYD 13-10c**	Swale	**None**	1	**Upland Mixed**	0.095	**0.0**	30.0	**0.002**	0.00	**0.20**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.003	**0.0**	43.0	**0.009**	0.00	**0.20**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Wet Prairies	0.013	**0.0**	73.0	**0.071**	0.00	**0.20**	0.00	**0.00**	0.10	**0.00**	1.00	**0.00**	0.00
	LYD 13-10d	None	**None**	1	**Commercial**	0.201	**1.9**	55.0	**0.037**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.03
					MDR	1.652	**0.0**	56.2	**0.024**	0.16	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15
					Transportation	0.003	**0.0**	80.0	**0.111**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	0.821	**0.0**	30.0	**0.002**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
					Upland Nonforested	1.798	**0.0**	52.7	**0.019**	0.14	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.13
					Wet Prairies	2.211	**0.0**	73.0	**0.071**	0.65	**0.00**	0.00	**0.00**	0.10	**0.06**	1.00	**0.58**	0.00
	LYD 13-11a	None	**None**	4	**Commercial**	3.474	**0.0**	54.0	**0.021**	0.30	**0.00**	0.00	**0.00**	0.65	**0.19**	0.00	**0.00**	0.10
					Industrial	0.239	**0.0**	39.0	**0.006**	0.01	**0.00**	0.00	**0.00**	0.65	**0.00**	0.00	**0.00**	0.00
					LDR	5.352	**0.0**	81.8	**0.129**	2.85	**0.00**	0.00	**0.00**	0.65	**1.86**	0.00	**0.00**	1.00
					MDR	19.248	**0.0**	59.8	**0.030**	2.40	**0.00**	0.00	**0.00**	0.65	**1.56**	0.00	**0.00**	0.84
					Pine Flatwoods	4.207	**0.0**	77.0	**0.092**	1.60	**0.00**	0.00	**0.00**	0.65	**1.04**	0.00	**0.00**	0.56
					Shrub and Brushland	0.786	**0.0**	73.0	**0.071**	0.23	**0.00**	0.00	**0.00**	0.65	**0.15**	0.00	**0.00**	0.08
					Upland Mixed	7.939	**0.0**	77.0	**0.092**	3.02	**0.00**	0.00	**0.00**	0.65	**1.96**	0.00	**0.00**	1.06
					Upland Nonforested	9.463	**0.0**	81.1	**0.122**	4.77	**0.00**	0.00	**0.00**	0.65	**3.10**	0.00	**0.00**	1.67
					Wetlands	12.832	**0.0**	77.0	**0.092**	4.88	**0.00**	0.00	**0.00**	0.65	**3.17**	1.00	**1.71**	0.00
	LYD 13-11b	Swale	**None**	0	**Transportation**	0.000	**0.0**	85.3	**0.165**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
		Wet Pond	**None**	0	**Commercial**	4.400	**77.8**	63.5	**0.638**	11.63	**0.20**	0.00	**2.33**	0.00	**0.00**	0.00	**0.00**	9.30
	LYD 13-12a	None	**None**	2	**Pasture**	3.066	**0.0**	83.7	**0.147**	1.87	**0.00**	0.00	**0.00**	0.25	**0.47**	0.00	**0.00**	1.40
	LYD 13-12b	Swale	**None**	0	**Commercial**	2.933	**26.1**	72.3	**0.261**	3.17	**0.20**	0.00	**0.63**	0.00	**0.00**	0.00	**0.00**	2.53
					Industrial	0.411	**0.0**	57.8	**0.027**	0.05	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.04
					MDR	1.964	**0.0**	52.3	**0.018**	0.15	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.12
					Transportation	8.020	**0.0**	69.4	**0.056**	1.85	**0.20**	0.00	**0.37**	0.00	**0.00**	0.00	**0.00**	1.48
					Upland Mixed	0.451	**0.0**	43.1	**0.009**	0.02	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
					Upland Nonforested	0.947	**0.0**	82.0	**0.130**	0.51	**0.20**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.41
					Wet Prairies	0.574	**0.0**	73.0	**0.071**	0.17	**0.20**	0.00	**0.03**	0.00	**0.00**	1.00	**0.13**	0.00
	LYD 13-13a	Dry Pond	**None**	0	**Institutional**	2.955	**24.1**	68.8	**0.236**	2.89	**0.80**	0.00	**2.31**	0.00	**0.00**	0.00	**0.00**	0.58
	LYD 13-13b	None	**None**	5	**Pasture**	2.875	**0.0**	84.0	**0.150**	1.78	**0.00**	0.00	**0.00**	0.80	**1.43**	0.00	**0.00**	0.36
	LYD 13-13c	Swale	**None**	0	**Industrial**	1.566	**19.1**	61.8	**0.182**	1.18	**0.20**	0.00	**0.24**	0.00	**0.00**	0.00	**0.00**	0.95
					Institutional	0.248	**7.4**	63.0	**0.094**	0.10	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.08
					MDR	5.798	**0.0**	50.4	**0.016**	0.38	**0.20**	0.00	**0.08**	0.00	**0.00**	0.00	**0.00**	0.30
					Multi-Family	1.171	**0.0**	61.4	**0.034**	0.16	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.13
					Pasture	6.714	**0.0**	83.8	**0.148**	4.10	**0.20**	0.00	**0.82**	0.00	**0.00**	0.00	**0.00**	3.28
					Transportation	3.298	**0.0**	81.3	**0.124**	1.69	**0.20**	0.00	**0.34**	0.00	**0.00**	0.00	**0.00**	1.35
					Upland Nonforested	0.016	**0.0**	82.0	**0.130**	0.01	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
LYD 14-01	**LYD 14-01**	None	**None**	0	**Upland Nonforested**	5.837	**0.0**	63.0	**0.037**	0.90	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.90
					Wetlands	11.834	**0.0**	77.0	**0.092**	4.50	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**4.50**	0.00
		Swale	**None**	0	**Transportation**	1.092	**0.0**	59.8	**0.030**	0.14	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.11
	LYD 14-02a	None	**None**	2	**Industrial**	0.018	**0.0**	61.0	**0.033**	0.00	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.00
					LDR	0.069	**0.0**	48.5	**0.014**	0.00	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.00
					Pasture	3.093	**0.0**	50.8	**0.016**	0.21	**0.00**	0.00	**0.00**	0.25	**0.05**	0.00	**0.00**	0.16
					Wetlands	7.655	**0.0**	77.0	**0.092**	2.91	**0.00**	0.00	**0.00**	0.25	**0.73**	1.00	**2.18**	0.00
	LYD 14-02b	Wet Pond	**None**	0	**Industrial**	9.414	**14.5**	74.5	**0.183**	7.15	**0.20**	0.00	**1.43**	0.00	**0.00**	0.00	**0.00**	5.72
					Transportation	0.007	**0.0**	85.1	**0.162**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Wet Prairies	0.849	**0.0**	73.0	**0.071**	0.25	**0.20**	0.00	**0.05**	0.00	**0.00**	1.00	**0.20**	0.00
					Wetlands	1.017	**0.0**	77.0	**0.092**	0.39	**0.20**	0.00	**0.08**	0.00	**0.00**	1.00	**0.31**	0.00
	LYD 14-02c	Swale	**None**	0	**Industrial**	0.448	**0.0**	61.6	**0.034**	0.06	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.05
					LDR	0.504	**0.0**	48.5	**0.014**	0.03	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.02
					MDR	0.449	**0.0**	62.6	**0.036**	0.07	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.05
					Pasture	6.049	**0.0**	49.2	**0.015**	0.37	**0.20**	0.00	**0.07**	0.00	**0.00**	0.00	**0.00**	0.29
					Transportation	2.648	**0.0**	66.1	**0.045**	0.50	**0.20**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.40
					Wetlands	0.223	**0.0**	77.0	**0.092**	0.08	**0.20**	0.00	**0.02**	0.00	**0.00**	1.00	**0.07**	0.00
	LYD 14-03a	None	**None**	1	**Industrial**	0.794	**1.0**	65.2	**0.050**	0.16	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15
					LDR	0.472	**0.0**	48.5	**0.014**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					Pasture	3.324	**0.0**	59.7	**0.030**	0.41	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.37

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 14-01	LYD 14-03a	None	None	1	Wet Prairies	0.384	0.0	73.0	0.071	0.11	0.00	0.00	0.00	0.10	0.01	1.00	0.10	0.00
					Wetlands	16.029	0.0	77.0	0.092	6.10	0.00	0.00	0.00	0.10	0.61	1.00	5.49	0.00
	LYD 14-04a	None	None	3	Industrial	1.349	0.0	60.3	0.031	0.17	0.00	0.00	0.00	0.50	0.09	0.00	0.00	0.09
					Institutional	0.063	0.0	39.0	0.006	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
					LDR	2.374	0.0	48.5	0.014	0.14	0.00	0.00	0.00	0.50	0.07	0.00	0.00	0.07
					MDR	1.168	0.0	62.6	0.036	0.18	0.00	0.00	0.00	0.50	0.09	0.00	0.00	0.09
					Pasture	8.189	0.0	49.0	0.014	0.49	0.00	0.00	0.00	0.50	0.24	0.00	0.00	0.24
					Transportation	0.284	0.0	79.5	0.108	0.13	0.00	0.00	0.00	0.50	0.06	0.00	0.00	0.06
					Wetlands	5.271	0.0	77.0	0.092	2.00	0.00	0.00	0.00	0.50	1.00	1.00	1.00	0.00
		Swale	None	3	Industrial	1.009	0.0	60.0	0.030	0.13	0.20	0.00	0.03	0.50	0.05	0.00	0.00	0.05
					Institutional	1.296	0.0	53.0	0.019	0.10	0.20	0.00	0.02	0.50	0.04	0.00	0.00	0.04
					MDR	1.537	0.0	62.6	0.036	0.23	0.20	0.00	0.05	0.50	0.09	0.00	0.00	0.09
					Transportation	1.125	0.0	68.1	0.052	0.24	0.20	0.00	0.05	0.50	0.10	0.00	0.00	0.10
LYD 15-01	LYD 15-01	None	None	0	Upland Nonforested	9.687	0.0	61.1	0.033	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32
					Wetlands	7.016	0.0	77.0	0.092	2.67	0.00	0.00	0.00	0.00	0.00	1.00	2.67	0.00
LYD 16-01	LYD 16-01	None	None	1	MDR	0.264	0.0	39.1	0.006	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Transportation	0.479	0.0	57.3	0.026	0.05	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.05
					Upland Nonforested	10.158	0.0	73.9	0.074	3.13	0.00	0.00	0.00	0.10	0.31	0.00	0.00	2.82
					Wetlands	21.409	0.0	77.0	0.092	8.14	0.00	0.00	0.00	0.10	0.81	1.00	7.33	0.00
	LYD 16-02a	Swale	None	0	Citrus Groves	11.060	0.0	43.0	0.009	0.41	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.33
					Industrial	10.479	0.0	70.1	0.058	2.51	0.20	0.00	0.50	0.00	0.00	0.00	0.00	2.01
					LDR	6.737	0.0	45.8	0.011	0.31	0.20	0.00	0.06	0.00	0.00	0.00	0.00	0.25
					MDR	1.927	0.4	62.5	0.039	0.31	0.20	0.00	0.06	0.00	0.00	0.00	0.00	0.25
					Pasture	0.487	0.0	49.0	0.014	0.03	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.02
					Transportation	3.157	0.0	56.8	0.025	0.33	0.20	0.00	0.07	0.00	0.00	0.00	0.00	0.26
					Upland Mixed	8.724	0.0	30.0	0.002	0.08	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.07
					Wetlands	3.619	0.0	77.0	0.092	1.38	0.20	0.00	0.28	0.00	0.00	1.00	1.10	0.00
	LYD 16-02b	Swale	None	0	MDR	0.015	0.0	39.0	0.006	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Transportation	1.640	0.0	55.8	0.023	0.16	0.20	0.00	0.03	0.00	0.00	0.00	0.00	0.13
					Upland Nonforested	0.301	0.0	82.0	0.130	0.16	0.20	0.00	0.03	0.00	0.00	0.00	0.00	0.13
	LYD 16-02c	Swale	None	0	Transportation	2.215	0.0	59.0	0.029	0.26	0.20	0.00	0.05	0.00	0.00	0.00	0.00	0.21
					Upland Nonforested	0.757	0.0	52.6	0.019	0.06	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.05
	LYD 16-03a	None	None	2	Transportation	0.063	0.0	64.0	0.040	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
		Swale	None	2	Industrial	4.389	0.0	60.3	0.031	0.57	0.20	0.00	0.11	0.25	0.11	0.00	0.00	0.34
					MDR	2.225	0.0	62.7	0.037	0.34	0.20	0.00	0.07	0.25	0.07	0.00	0.00	0.20
					Transportation	0.475	0.0	79.3	0.106	0.21	0.20	0.00	0.04	0.25	0.04	0.00	0.00	0.13
					Wet Prairies	0.334	0.0	73.0	0.071	0.10	0.20	0.00	0.02	0.25	0.02	1.00	0.06	0.00
					Wetlands	2.324	0.0	77.0	0.092	0.88	0.20	0.00	0.18	0.25	0.18	1.00	0.53	0.00
	LYD 16-04a	Swale	None	0	Industrial	0.220	0.0	64.0	0.040	0.04	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.03
					LDR	0.173	0.0	45.8	0.011	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.01
					Transportation	1.781	0.0	59.0	0.029	0.21	0.20	0.00	0.04	0.00	0.00	0.00	0.00	0.17
					Upland Mixed	0.182	0.0	30.0	0.002	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	0.031	0.0	43.0	0.009	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LYD 16-04b	Swale	None	0	MDR	10.097	0.0	55.7	0.023	0.96	0.20	0.00	0.19	0.00	0.00	0.00	0.00	0.77
					Pine Flatwoods	0.006	0.0	30.0	0.002	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Transportation	6.055	0.0	61.3	0.033	0.84	0.20	0.00	0.17	0.00	0.00	0.00	0.00	0.67
	LYD 16-04c	None	None	4	MDR	7.798	0.0	63.8	0.039	1.26	0.00	0.00	0.00	0.65	0.82	0.00	0.00	0.44
	LYD 16-04d	Swale	None	0	MDR	26.662	0.0	62.3	0.036	3.96	0.20	0.00	0.79	0.00	0.00	0.00	0.00	3.16
					Pasture	0.119	0.0	49.0	0.014	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.01
LYD 17-01	LYD 17-01	Swale	None	0	LDR	0.003	0.0	45.8	0.011	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					MDR	2.641	15.7	51.5	0.142	1.55	0.20	0.00	0.31	0.00	0.00	0.00	0.00	1.24
					Transportation	1.553	0.0	55.8	0.023	0.15	0.20	0.00	0.03	0.00	0.00	0.00	0.00	0.12
	LYD 17-02a	Dry Pond	None	0	LDR	7.113	0.0	45.8	0.011	0.33	0.80	0.00	0.26	0.00	0.00	0.00	0.00	0.07
					MDR	32.393	19.3	53.1	0.172	23.03	0.80	0.00	18.43	0.00	0.00	0.00	0.00	4.61
					Transportation	0.247	0.0	55.5	0.023	0.02	0.80	0.00	0.02	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	6.864	0.0	43.0	0.009	0.26	0.80	0.00	0.20	0.00	0.00	0.00	0.00	0.05
LYD 18-01	LYD 18-01	Dry Pond	None	0	MDR	9.982	19.7	53.5	0.175	7.25	0.80	0.00	5.80	0.00	0.00	0.00	0.00	1.45

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 18-01	LYD 18-01	Dry Pond	None	0	Transportation	0.059	0.0	55.8	0.023	0.01	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LYD 19-01	LYD 19-01	Swale	None	0	Citrus Groves	10.821	0.0	43.0	0.009	0.40	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.32
					LDR	18.013	0.0	47.1	0.013	0.94	0.20	0.00	0.19	0.00	0.00	0.00	0.00	0.75
					MDR	2.113	18.7	52.5	0.166	1.45	0.20	0.00	0.29	0.00	0.00	0.00	0.00	1.16
					Transportation	7.401	0.0	55.8	0.023	0.71	0.20	0.00	0.14	0.00	0.00	0.00	0.00	0.57
					Upland Nonforested	13.091	0.0	43.0	0.009	0.49	0.20	0.00	0.10	0.00	0.00	0.00	0.00	0.39
	LYD 19-02a	None	None	6	MDR	0.051	9.7	45.3	0.088	0.02	0.00	0.00	0.00	0.90	0.02	0.00	0.00	0.00
		Swale	None	6	LDR	25.361	0.0	47.1	0.013	1.32	0.20	0.00	0.26	0.90	0.95	0.00	0.00	0.11
					Pasture	0.003	0.0	49.0	0.014	0.00	0.20	0.00	0.00	0.90	0.00	0.00	0.00	0.00
					Upland Nonforested	0.405	0.0	43.0	0.009	0.02	0.20	0.00	0.00	0.90	0.01	0.00	0.00	0.00
	LYD 19-03a	Swale	None	2	LDR	8.362	0.0	47.1	0.013	0.43	0.20	0.00	0.09	0.25	0.09	0.00	0.00	0.26
					MDR	0.002	20.0	53.8	0.178	0.00	0.20	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Upland Nonforested	2.821	0.0	43.0	0.009	0.10	0.20	0.00	0.02	0.25	0.02	0.00	0.00	0.06
	LYD 19-03b	Swale	None	0	LDR	8.317	0.0	49.9	0.015	0.53	0.20	0.00	0.11	0.00	0.00	0.00	0.00	0.42
					MDR	3.220	7.5	54.4	0.080	1.06	0.20	0.00	0.21	0.00	0.00	0.00	0.00	0.85
					Pasture	9.896	0.0	49.0	0.014	0.59	0.20	0.00	0.12	0.00	0.00	0.00	0.00	0.47
					Pine Flatwoods	3.863	0.0	30.0	0.002	0.04	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.03
					Upland Nonforested	3.835	0.0	43.0	0.009	0.14	0.20	0.00	0.03	0.00	0.00	0.00	0.00	0.11
	LYD 19-03c	Dry Pond	None	0	MDR	12.542	18.0	52.0	0.161	8.34	0.80	0.00	6.67	0.00	0.00	0.00	0.00	1.67
		None	None	0	LDR	0.740	0.0	47.1	0.013	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
					Pasture	0.478	0.0	49.0	0.014	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	LYD 19-03d	Dry Pond	None	0	MDR	7.908	9.9	39.0	0.086	2.81	0.80	0.00	2.25	0.00	0.00	0.00	0.00	0.56
	LYD 19-03e	Dry Pond	None	0	MDR	13.587	12.9	39.2	0.110	6.20	0.80	0.00	4.96	0.00	0.00	0.00	0.00	1.24
	LYD 19-04a	Dry Pond	None	0	LDR	0.536	0.0	47.1	0.013	0.03	0.80	0.00	0.02	0.00	0.00	0.00	0.00	0.01
					MDR	8.613	18.9	52.8	0.168	6.00	0.80	0.00	4.80	0.00	0.00	0.00	0.00	1.20
					Upland Nonforested	0.435	0.0	43.0	0.009	0.02	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	LYD 19-04b	Dry Pond	None	0	Commercial	1.104	25.5	41.6	0.212	0.97	0.80	0.00	0.78	0.00	0.00	0.00	0.00	0.19
					MDR	21.758	18.3	52.7	0.164	14.73	0.80	0.00	11.78	0.00	0.00	0.00	0.00	2.95
					Pine Flatwoods	0.334	0.0	30.0	0.002	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Mixed	0.042	0.0	30.0	0.002	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	10.590	0.0	43.0	0.009	0.39	0.80	0.00	0.31	0.00	0.00	0.00	0.00	0.08
		Swale	Dry Pond	0	Citrus Groves	5.102	0.0	43.0	0.009	0.19	0.20	0.80	0.16	0.00	0.00	0.00	0.00	0.03
					LDR	0.543	0.0	50.9	0.016	0.04	0.20	0.80	0.03	0.00	0.00	0.00	0.00	0.01
					Pine Flatwoods	6.147	0.0	30.0	0.002	0.06	0.20	0.80	0.05	0.00	0.00	0.00	0.00	0.01
					Transportation	2.052	0.0	75.9	0.085	0.72	0.20	0.80	0.61	0.00	0.00	0.00	0.00	0.12
					Upland Hardwood	4.140	0.0	30.0	0.002	0.04	0.20	0.80	0.03	0.00	0.00	0.00	0.00	0.01
	LYD 19-04c	Dry Pond	None	0	MDR	8.341	3.7	51.7	0.046	1.60	0.80	0.00	1.28	0.00	0.00	0.00	0.00	0.32
					Pasture	0.152	0.0	49.0	0.014	0.01	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	LYD 19-05a	Dry Pond	None	1	Commercial	0.648	14.1	41.4	0.121	0.32	0.80	0.00	0.26	0.10	0.01	0.00	0.00	0.06
					MDR	0.194	20.0	53.8	0.178	0.14	0.80	0.00	0.11	0.10	0.00	0.00	0.00	0.03
					Transportation	0.821	0.0	75.4	0.082	0.28	0.80	0.00	0.22	0.10	0.01	0.00	0.00	0.05
					Upland Nonforested	11.543	0.0	43.0	0.009	0.43	0.80	0.00	0.34	0.10	0.01	0.00	0.00	0.08
	LYD 19-05b	Dry Pond	None	0	Commercial	1.408	54.3	46.8	0.445	2.60	0.80	0.00	2.08	0.00	0.00	0.00	0.00	0.52
	LYD 19-05c	Swale	Dry Pond	1	Citrus Groves	1.300	0.0	43.0	0.009	0.05	0.20	0.80	0.04	0.10	0.00	0.00	0.00	0.01
					Commercial	0.526	28.1	41.6	0.233	0.51	0.20	0.80	0.43	0.10	0.01	0.00	0.00	0.07
					LDR	2.299	0.0	48.9	0.014	0.14	0.20	0.80	0.11	0.10	0.00	0.00	0.00	0.02
					MDR	0.329	6.4	55.3	0.073	0.10	0.20	0.80	0.08	0.10	0.00	0.00	0.00	0.01
					Pine Flatwoods	5.791	0.0	30.0	0.002	0.06	0.20	0.80	0.05	0.10	0.00	0.00	0.00	0.01
					Transportation	2.272	0.0	72.9	0.070	0.66	0.20	0.80	0.55	0.10	0.01	0.00	0.00	0.10
					Upland Mixed	7.080	0.0	30.0	0.002	0.07	0.20	0.80	0.06	0.10	0.00	0.00	0.00	0.01
					Upland Nonforested	1.081	0.0	43.0	0.009	0.04	0.20	0.80	0.03	0.10	0.00	0.00	0.00	0.01
	LYD 19-05d	Dry Pond	None	0	LDR	0.822	0.0	48.5	0.014	0.05	0.80	0.00	0.04	0.00	0.00	0.00	0.00	0.01
					MDR	10.835	5.0	52.3	0.058	2.60	0.80	0.00	2.08	0.00	0.00	0.00	0.00	0.52
					Upland Mixed	0.176	0.0	30.0	0.002	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	2.067	0.0	43.0	0.009	0.08	0.80	0.00	0.06	0.00	0.00	0.00	0.00	0.02
	LYD 19-05e	Dry Pond	None	0	MDR	14.912	4.3	53.8	0.054	3.33	0.80	0.00	2.66	0.00	0.00	0.00	0.00	0.67
					Upland Nonforested	0.053	0.0	43.0	0.009	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 19-01	**LYD 19-05f**	Dry Pond	**None**	0	**Commercial**	1.052	**49.4**	53.4	**0.409**	1.78	**0.80**	0.00	**1.43**	0.00	**0.00**	0.00	**0.00**	0.36
LYD 20-01	**LYD 20-01**	None	**None**	0	**Citrus Groves**	24.600	**0.0**	43.4	**0.009**	0.94	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.94
					LDR	2.357	**0.0**	45.8	**0.011**	0.11	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.11
					Nurseries	38.361	**0.0**	50.1	**0.016**	2.46	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.46
					Transportation	0.978	**0.0**	68.5	**0.053**	0.21	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.21
					Upland Mixed	10.100	**0.0**	45.6	**0.011**	0.46	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.46
					Upland Nonforested	1.192	**0.0**	43.0	**0.009**	0.04	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.04
LYD 21-01	**LYD 21-01**	None	**None**	0	**Citrus Groves**	68.725	**0.0**	43.0	**0.009**	2.56	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.56
					LDR	12.960	**0.0**	48.1	**0.014**	0.73	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.73
					Nurseries	25.587	**0.0**	49.0	**0.014**	1.53	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.53
					Pasture	8.244	**0.0**	49.0	**0.014**	0.49	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.49
					Transportation	3.495	**0.0**	68.5	**0.053**	0.76	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.76
					Upland Mixed	8.969	**0.0**	33.4	**0.004**	0.13	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.13
					Upland Nonforested	14.613	**0.0**	43.0	**0.009**	0.54	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.54
	LYD 21-02a	None	**None**	2	**Citrus Groves**	23.882	**0.0**	43.0	**0.009**	0.89	**0.00**	0.00	**0.00**	0.25	**0.22**	0.00	**0.00**	0.67
					LDR	3.729	**0.0**	46.1	**0.012**	0.18	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.13
					Transportation	0.010	**0.0**	55.8	**0.023**	0.00	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	3.305	**0.0**	43.0	**0.009**	0.12	**0.00**	0.00	**0.00**	0.25	**0.03**	0.00	**0.00**	0.09
	LYD 21-02b	None	**None**	3	**Citrus Groves**	5.332	**0.0**	43.0	**0.009**	0.20	**0.00**	0.00	**0.00**	0.50	**0.10**	0.00	**0.00**	0.10
					LDR	2.780	**0.0**	48.5	**0.014**	0.16	**0.00**	0.00	**0.00**	0.50	**0.08**	0.00	**0.00**	0.08
					Nurseries	4.004	**0.0**	49.0	**0.014**	0.24	**0.00**	0.00	**0.00**	0.50	**0.12**	0.00	**0.00**	0.12
					Transportation	0.505	**0.0**	68.5	**0.053**	0.11	**0.00**	0.00	**0.00**	0.50	**0.06**	0.00	**0.00**	0.06
	LYD 21-03a	None	**None**	3	**Citrus Groves**	5.318	**0.0**	43.0	**0.009**	0.20	**0.00**	0.00	**0.00**	0.50	**0.10**	0.00	**0.00**	0.10
					LDR	0.017	**0.0**	48.5	**0.014**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					Pasture	0.618	**0.0**	49.0	**0.014**	0.04	**0.00**	0.00	**0.00**	0.50	**0.02**	0.00	**0.00**	0.02
					Transportation	0.107	**0.0**	68.5	**0.053**	0.02	**0.00**	0.00	**0.00**	0.50	**0.01**	0.00	**0.00**	0.01
	LYD 21-03b	None	**None**	3	**Citrus Groves**	7.604	**0.0**	43.0	**0.009**	0.28	**0.00**	0.00	**0.00**	0.50	**0.14**	0.00	**0.00**	0.14
					LDR	0.957	**0.0**	47.2	**0.013**	0.05	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					Pasture	1.337	**0.0**	49.0	**0.014**	0.08	**0.00**	0.00	**0.00**	0.50	**0.04**	0.00	**0.00**	0.04
					Transportation	0.019	**0.0**	68.5	**0.053**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	5.745	**0.0**	43.0	**0.009**	0.21	**0.00**	0.00	**0.00**	0.50	**0.11**	0.00	**0.00**	0.11
		Swale	**None**	3	**Transportation**	3.692	**0.0**	55.8	**0.023**	0.36	**0.20**	0.00	**0.07**	0.50	**0.14**	0.00	**0.00**	0.14
	LYD 21-04a	None	**None**	1	**Citrus Groves**	6.309	**0.0**	43.0	**0.009**	0.23	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.21
					Pasture	0.108	**0.0**	49.0	**0.014**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
	LYD 21-05a	None	**None**	3	**Citrus Groves**	1.673	**0.0**	43.0	**0.009**	0.06	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					LDR	2.247	**0.0**	48.5	**0.014**	0.13	**0.00**	0.00	**0.00**	0.50	**0.06**	0.00	**0.00**	0.06
					Pasture	5.847	**0.0**	49.0	**0.014**	0.35	**0.00**	0.00	**0.00**	0.50	**0.17**	0.00	**0.00**	0.17
					Transportation	0.476	**0.0**	68.5	**0.053**	0.10	**0.00**	0.00	**0.00**	0.50	**0.05**	0.00	**0.00**	0.05
LYD 22-01	**LYD 22-01**	None	**None**	0	**Citrus Groves**	27.881	**0.0**	43.0	**0.009**	1.04	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.04
					LDR	10.616	**0.0**	46.9	**0.012**	0.54	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.54
					Nurseries	7.984	**0.0**	51.2	**0.017**	0.56	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.56
					Pasture	1.440	**0.0**	49.0	**0.014**	0.09	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.09
					Pine Flatwoods	3.864	**0.0**	30.0	**0.002**	0.04	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.04
					Transportation	2.487	**0.0**	68.5	**0.053**	0.54	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.54
					Upland Nonforested	4.351	**0.0**	43.0	**0.009**	0.16	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.16
	LYD 22-02a	None	**None**	1	**Citrus Groves**	17.290	**0.0**	43.0	**0.009**	0.64	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.58
					LDR	1.198	**0.0**	48.5	**0.014**	0.07	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.06
					Nurseries	0.213	**0.0**	98.0	**0.595**	0.52	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.47
					Pine Flatwoods	13.729	**0.0**	30.0	**0.002**	0.13	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.12
					Transportation	0.390	**0.0**	68.5	**0.053**	0.09	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.08
	LYD 22-02b	None	**None**	1	**Citrus Groves**	12.155	**0.0**	43.0	**0.009**	0.45	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.41
					LDR	1.244	**0.0**	45.8	**0.011**	0.06	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.05
					Nurseries	23.334	**0.0**	49.1	**0.015**	1.40	**0.00**	0.00	**0.00**	0.10	**0.14**	0.00	**0.00**	1.26
					Pasture	17.123	**0.0**	49.0	**0.014**	1.02	**0.00**	0.00	**0.00**	0.10	**0.10**	0.00	**0.00**	0.92
					Pine Flatwoods	2.718	**0.0**	30.0	**0.002**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
	LYD 22-03a	None	**None**	2	**Citrus Groves**	4.337	**0.0**	43.0	**0.009**	0.16	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.12
					Pasture	5.560	**0.0**	49.0	**0.014**	0.33	**0.00**	0.00	**0.00**	0.25	**0.08**	0.00	**0.00**	0.25

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 23-01	**LYD 23-01**	None	**None**	0	**Citrus Groves**	12.972	**0.0**	43.0	**0.009**	0.48	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.48
					LDR	1.509	**0.0**	48.5	**0.014**	0.09	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.09
					Pine Flatwoods	7.350	**0.0**	30.0	**0.002**	0.07	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.07
LYD 24-01	**LYD 24-01**	None	**None**	0	**Citrus Groves**	0.098	**0.0**	43.0	**0.009**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					LDR	1.124	**0.0**	45.8	**0.011**	0.05	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.05
	LYD 24-02a	None	**None**	7	**Citrus Groves**	4.985	**0.0**	43.0	**0.009**	0.19	**0.00**	0.00	**0.00**	1.00	**0.19**	0.00	**0.00**	0.00
					LDR	0.498	**0.0**	45.8	**0.011**	0.02	**0.00**	0.00	**0.00**	1.00	**0.02**	0.00	**0.00**	0.00
					Wetlands	0.483	**0.0**	77.0	**0.092**	0.18	**0.00**	0.00	**0.00**	1.00	**0.18**	1.00	**0.00**	0.00
LYD 25-01	**LYD 25-01**	None	**None**	0	**Citrus Groves**	20.309	**0.0**	43.0	**0.009**	0.76	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.76
					LDR	0.590	**0.0**	45.8	**0.011**	0.03	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.03
	LYD 25-02a	None	**None**	7	**Citrus Groves**	14.233	**0.0**	43.0	**0.009**	0.53	**0.00**	0.00	**0.00**	1.00	**0.53**	0.00	**0.00**	0.00
					Wetlands	0.616	**0.0**	77.0	**0.092**	0.23	**0.00**	0.00	**0.00**	1.00	**0.23**	1.00	**0.00**	0.00
LYD 26-01	**LYD 26-01**	None	**None**	0	**Citrus Groves**	15.711	**0.0**	43.0	**0.009**	0.58	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.58
					Nurseries	4.252	**0.0**	52.4	**0.018**	0.32	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.32
					Pasture	48.816	**0.0**	49.3	**0.015**	2.97	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.97
					Upland Mixed	25.971	**0.0**	30.0	**0.002**	0.25	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.25
	LYD 26-02a	None	**None**	7	**Citrus Groves**	1.362	**0.0**	43.0	**0.009**	0.05	**0.00**	0.00	**0.00**	1.00	**0.05**	0.00	**0.00**	0.00
					Nurseries	19.663	**0.0**	49.0	**0.014**	1.17	**0.00**	0.00	**0.00**	1.00	**1.17**	0.00	**0.00**	0.00
					Pasture	10.319	**0.0**	49.0	**0.014**	0.61	**0.00**	0.00	**0.00**	1.00	**0.61**	0.00	**0.00**	0.00
					Upland Mixed	0.901	**0.0**	30.0	**0.002**	0.01	**0.00**	0.00	**0.00**	1.00	**0.01**	0.00	**0.00**	0.00
	LYD 26-02b	None	**None**	1	**Citrus Groves**	4.574	**0.0**	43.0	**0.009**	0.17	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15
					Pasture	0.005	**0.0**	49.0	**0.014**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
	LYD 26-02c	None	**None**	3	**Citrus Groves**	12.558	**0.0**	43.0	**0.009**	0.47	**0.00**	0.00	**0.00**	0.50	**0.23**	0.00	**0.00**	0.23
					Pasture	26.454	**0.0**	49.0	**0.014**	1.58	**0.00**	0.00	**0.00**	0.50	**0.79**	0.00	**0.00**	0.79
	LYD 26-03a	None	**None**	3	**Citrus Groves**	7.493	**0.0**	43.0	**0.009**	0.28	**0.00**	0.00	**0.00**	0.50	**0.14**	0.00	**0.00**	0.14
					Pasture	17.788	**0.0**	49.0	**0.014**	1.06	**0.00**	0.00	**0.00**	0.50	**0.53**	0.00	**0.00**	0.53
		Swale	**None**	3	**Transportation**	2.637	**0.0**	55.8	**0.023**	0.25	**0.20**	0.00	**0.05**	0.50	**0.10**	0.00	**0.00**	0.10
	LYD 26-03b	None	**None**	1	**Citrus Groves**	1.222	**0.0**	43.0	**0.009**	0.05	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					Nurseries	3.471	**0.0**	52.3	**0.018**	0.26	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.24
					Pine Flatwoods	0.027	**0.0**	30.0	**0.002**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
	LYD 26-03c	None	**None**	1	**Pasture**	4.482	**0.0**	49.0	**0.014**	0.27	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.24
	LYD 26-04a	None	**None**	4	**Citrus Groves**	5.758	**0.0**	43.0	**0.009**	0.21	**0.00**	0.00	**0.00**	0.65	**0.14**	0.00	**0.00**	0.07
					Pasture	0.009	**0.0**	49.0	**0.014**	0.00	**0.00**	0.00	**0.00**	0.65	**0.00**	0.00	**0.00**	0.00
LYD 27-01	**LYD 27-01**	None	**None**	0	**Citrus Groves**	1.405	**0.0**	43.0	**0.009**	0.05	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.05
					Mobile Homes	1.729	**0.0**	73.8	**0.074**	0.53	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.53
					Pasture	11.244	**0.0**	49.9	**0.015**	0.71	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.71
					Wetlands	0.023	**0.0**	77.0	**0.092**	0.01	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**0.01**	0.00
LYD 28-01	**LYD 28-01**	None	**None**	0	**Mobile Homes**	10.155	**1.2**	74.0	**0.084**	3.51	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	3.51
					Transportation	0.002	**0.0**	55.8	**0.023**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.415	**0.0**	43.0	**0.009**	0.02	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Wetlands	42.941	**0.0**	77.0	**0.092**	16.33	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**16.33**	0.00
	LYD 28-02a	Dry Pond	**None**	0	**Mining**	0.001	**0.0**	68.0	**0.051**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Mobile Homes	15.952	**0.0**	66.3	**0.046**	3.05	**0.80**	0.00	**2.44**	0.00	**0.00**	0.00	**0.00**	0.61
					Pasture	0.815	**0.0**	49.0	**0.014**	0.05	**0.80**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.01
					Wetlands	0.479	**0.0**	77.0	**0.092**	0.18	**0.80**	0.00	**0.15**	0.00	**0.00**	1.00	**0.04**	0.00
	LYD 28-02b	Swale	**None**	2	**Mining**	2.046	**0.0**	74.1	**0.075**	0.64	**0.20**	0.00	**0.13**	0.25	**0.13**	0.00	**0.00**	0.38
					Mobile Homes	2.429	**0.0**	54.5	**0.021**	0.21	**0.20**	0.00	**0.04**	0.25	**0.04**	0.00	**0.00**	0.13
					Pasture	23.731	**0.0**	49.1	**0.014**	1.42	**0.20**	0.00	**0.28**	0.25	**0.28**	0.00	**0.00**	0.85
					Transportation	4.227	**0.0**	55.8	**0.023**	0.41	**0.20**	0.00	**0.08**	0.25	**0.08**	0.00	**0.00**	0.24
	LYD 28-02c	Dry Pond	**None**	0	**Mobile Homes**	2.544	**0.0**	59.3	**0.029**	0.31	**0.80**	0.00	**0.25**	0.00	**0.00**	0.00	**0.00**	0.06
					Wetlands	0.039	**0.0**	77.0	**0.092**	0.01	**0.80**	0.00	**0.01**	0.00	**0.00**	1.00	**0.00**	0.00
	LYD 28-02d	Dry Pond	**None**	0	**Mobile Homes**	1.888	**14.4**	49.0	**0.129**	1.01	**0.80**	0.00	**0.81**	0.00	**0.00**	0.00	**0.00**	0.20
					Transportation	0.004	**0.0**	55.8	**0.023**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.184	**0.0**	43.0	**0.009**	0.01	**0.80**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.00
	LYD 28-02e	Dry Pond	**None**	0	**Mobile Homes**	1.175	**8.5**	50.6	**0.083**	0.40	**0.80**	0.00	**0.32**	0.00	**0.00**	0.00	**0.00**	0.08
					Upland Nonforested	1.974	**0.0**	50.9	**0.017**	0.14	**0.80**	0.00	**0.11**	0.00	**0.00**	0.00	**0.00**	0.03
		Swale	**Dry Pond**	0	**LDR**	3.377	**0.0**	45.8	**0.011**	0.16	**0.20**	0.80	**0.13**	0.00	**0.00**	0.00	**0.00**	0.03

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 28-01	LYD 28-02e	Swale	Dry Pond	0	MDR	1.580	0.0	52.3	0.018	0.12	0.20	0.80	0.10	0.00	0.00	0.00	0.00	0.02
					Pine Flatwoods	4.022	0.0	30.0	0.002	0.04	0.20	0.80	0.03	0.00	0.00	0.00	0.00	0.01
					Transportation	5.190	0.0	55.8	0.023	0.50	0.20	0.80	0.42	0.00	0.00	0.00	0.00	0.08
					Upland Mixed	21.329	0.0	30.0	0.002	0.21	0.20	0.80	0.17	0.00	0.00	0.00	0.00	0.03
					Upland Nonforested	9.194	0.0	43.0	0.009	0.34	0.20	0.80	0.29	0.00	0.00	0.00	0.00	0.05
	LYD 28-03a	Dry Pond	None	0	Citrus Groves	2.039	0.0	43.0	0.009	0.08	0.80	0.00	0.06	0.00	0.00	0.00	0.00	0.02
					Mining	0.013	0.0	68.0	0.051	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Mobile Homes	1.966	0.0	41.5	0.008	0.06	0.80	0.00	0.05	0.00	0.00	0.00	0.00	0.01
					Pasture	6.692	0.0	49.0	0.014	0.40	0.80	0.00	0.32	0.00	0.00	0.00	0.00	0.08
	LYD 28-03b	Dry Pond	None	3	Mining	13.377	0.0	69.6	0.056	3.12	0.80	0.00	2.50	0.50	0.31	0.00	0.00	0.31
					Pasture	2.138	0.0	49.0	0.014	0.13	0.80	0.00	0.10	0.50	0.01	0.00	0.00	0.01
	LYD 28-03c	Dry Pond	None	4	LDR	0.035	0.0	45.8	0.011	0.00	0.80	0.00	0.00	0.65	0.00	0.00	0.00	0.00
					MDR	45.481	0.0	51.3	0.017	3.22	0.80	0.00	2.58	0.65	0.42	0.00	0.00	0.23
					Pine Flatwoods	0.038	0.0	30.0	0.002	0.00	0.80	0.00	0.00	0.65	0.00	0.00	0.00	0.00
					Transportation	0.114	0.0	43.8	0.010	0.00	0.80	0.00	0.00	0.65	0.00	0.00	0.00	0.00
					Upland Mixed	0.286	0.0	30.0	0.002	0.00	0.80	0.00	0.00	0.65	0.00	0.00	0.00	0.00
					Upland Nonforested	0.199	0.0	43.0	0.009	0.01	0.80	0.00	0.01	0.65	0.00	0.00	0.00	0.00
LYD 29-01	LYD 29-01	None	None	0	Mobile Homes	6.895	0.0	82.3	0.134	3.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.82
					Wetlands	0.024	0.0	77.0	0.092	0.01	0.00	0.00	0.00	0.00	0.00	1.00	0.01	0.00
LYD 30-01	LYD 30-01	None	None	0	Mobile Homes	4.139	0.0	86.1	0.178	3.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.05
LYD 31-01	LYD 31-01	None	None	0	MDR	0.875	0.0	80.8	0.119	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
					Mobile Homes	1.252	0.0	87.3	0.198	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03
LYD 32-01	LYD 32-01	None	None	0	MDR	1.864	0.0	70.5	0.060	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
LYD 33-01	LYD 33-01	Dry Pond	None	0	MDR	0.582	0.0	39.0	0.006	0.02	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.00
					Mobile Homes	0.005	0.0	39.0	0.006	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		None	None	0	MDR	5.931	0.0	68.4	0.053	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
					Mobile Homes	19.926	0.0	81.8	0.129	10.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.63
					Upland Mixed	24.963	0.0	42.3	0.008	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
					Upland Nonforested	6.702	0.0	69.0	0.054	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51
					Wet Prairies	1.918	0.0	73.0	0.071	0.56	0.00	0.00	0.00	0.00	0.00	1.00	0.56	0.00
					Wetlands	11.546	0.0	77.0	0.092	4.39	0.00	0.00	0.00	0.00	0.00	1.00	4.39	0.00
	LYD 33-02a	None	None	1	Mobile Homes	5.695	0.0	80.3	0.114	2.68	0.00	0.00	0.00	0.10	0.27	0.00	0.00	2.41
					Transportation	0.048	0.0	55.8	0.023	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Upland Nonforested	1.702	0.0	43.0	0.009	0.06	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.06
	LYD 33-02b	Dry Pond	None	0	Mobile Homes	4.777	0.0	70.7	0.061	1.20	0.80	0.00	0.96	0.00	0.00	0.00	0.00	0.24
					Transportation	0.119	0.0	47.2	0.013	0.01	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LYD 33-02c	None	None	8	Mobile Homes	4.885	0.0	80.3	0.114	2.30	0.00	0.00	0.00	1.00	2.30	0.00	0.00	0.00
					Transportation	0.174	0.0	39.0	0.006	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
					Upland Mixed	2.810	0.0	30.0	0.002	0.03	0.00	0.00	0.00	1.00	0.03	0.00	0.00	0.00
	LYD 33-03a	Swale	None	0	MDR	0.013	0.0	39.0	0.006	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Transportation	3.993	0.0	57.2	0.026	0.42	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.34
					Upland Mixed	8.180	0.0	30.0	0.002	0.08	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.06
LYD 34-01	LYD 34-01	None	None	0	Institutional	0.480	0.0	51.8	0.018	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
					Upland Mixed	12.354	0.0	69.7	0.057	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.90
	LYD 34-02a	None	None	2	Institutional	0.078	0.0	69.5	0.056	0.02	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Upland Mixed	7.526	0.0	47.2	0.013	0.39	0.00	0.00	0.00	0.25	0.10	0.00	0.00	0.29
LYD 35-01	LYD 35-01	None	None	0	Institutional	0.164	0.0	61.0	0.033	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
					Upland Mixed	0.552	0.0	62.4	0.036	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
	LYD 35-02a	None	None	1	Institutional	5.551	0.0	51.7	0.018	0.41	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.36
					Upland Mixed	0.598	0.0	45.7	0.011	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.02
	LYD 35-03a	None	None	1	Institutional	2.011	0.0	56.2	0.024	0.20	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.18
LYD 36-01	LYD 36-01	None	None	0	Institutional	27.001	0.0	57.2	0.026	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.87
					LDR	1.022	0.0	51.3	0.017	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
					Mobile Homes	2.611	0.0	73.9	0.075	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81
					Upland Mixed	9.319	0.0	56.0	0.024	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
	LYD 36-02a	None	None	0	Institutional	4.485	0.0	63.5	0.039	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72
					Transportation	0.582	0.0	69.9	0.057	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYD 36-01	LYD 36-02a	None	None	0	Upland Mixed	3.730	0.0	63.2	0.038	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58
					Upland Nonforested	1.218	0.0	69.2	0.055	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
LYD 37-01	LYD 37-01	None	None	0	Institutional	10.563	0.0	49.8	0.015	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
					Upland Mixed	1.370	0.0	75.8	0.084	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
LYD 38-01	LYD 38-01	None	None	0	Institutional	8.966	0.0	56.6	0.025	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92
					LDR	2.654	0.0	80.6	0.117	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
					Upland Mixed	18.351	0.0	61.2	0.033	2.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53
					Upland Nonforested	0.410	0.0	70.4	0.059	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
					Wet Prairies	0.077	0.0	73.0	0.071	0.02	0.00	0.00	0.00	0.00	0.00	1.00	0.02	0.00
	LYD 38-02a	None	None	1	Institutional	0.410	0.0	82.1	0.132	0.22	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.20
					Upland Mixed	7.428	0.0	50.8	0.016	0.51	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.46
					Upland Nonforested	3.317	0.0	66.8	0.048	0.65	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.59
LYS-LYD	EL 01-01	None	None	1	Citrus Groves	49.250	0.0	46.6	0.012	2.45	0.00	0.00	0.00	0.10	0.25	0.00	0.00	2.21
					LDR	21.981	0.0	49.8	0.015	1.38	0.00	0.00	0.00	0.10	0.14	0.00	0.00	1.24
					Pasture	85.949	0.0	50.4	0.016	5.67	0.00	0.00	0.00	0.10	0.57	0.00	0.00	5.11
					Upland Hardwood	10.804	0.0	35.6	0.004	0.20	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.18
					Upland Mixed	72.805	0.0	41.7	0.008	2.42	0.00	0.00	0.00	0.10	0.24	0.00	0.00	2.18
					Upland Nonforested	6.983	0.0	43.0	0.009	0.26	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.23
					Wet Prairies	206.424	0.0	73.0	0.071	60.25	0.00	0.00	0.00	0.10	6.03	1.00	54.23	0.00
					Wetlands	1.415	0.0	77.0	0.092	0.54	0.00	0.00	0.00	0.10	0.05	1.00	0.48	0.00
	EL 01-02a	None	None	2	Nurseries	2.038	0.0	49.0	0.014	0.12	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.09
					Pasture	12.970	0.0	59.3	0.029	1.57	0.00	0.00	0.00	0.25	0.39	0.00	0.00	1.18
					Upland Hardwood	0.702	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Upland Mixed	0.004	0.0	77.0	0.092	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Wet Prairies	0.388	0.0	73.0	0.071	0.11	0.00	0.00	0.00	0.25	0.03	1.00	0.08	0.00
	EL 01-02b	None	None	3	Citrus Groves	2.682	0.0	43.0	0.009	0.10	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
					Pasture	2.307	0.0	59.6	0.030	0.28	0.00	0.00	0.00	0.50	0.14	0.00	0.00	0.14
					Upland Mixed	1.215	0.0	76.8	0.091	0.46	0.00	0.00	0.00	0.50	0.23	0.00	0.00	0.23
	EL 01-02c	None	None	4	Pasture	0.773	0.0	49.0	0.014	0.05	0.00	0.00	0.00	0.65	0.03	0.00	0.00	0.02
					Upland Mixed	3.002	0.0	44.2	0.010	0.12	0.00	0.00	0.00	0.65	0.08	0.00	0.00	0.04
					Wet Prairies	0.245	0.0	73.0	0.071	0.07	0.00	0.00	0.00	0.65	0.05	1.00	0.03	0.00
	EL 01-02d	None	None	4	Pasture	0.752	0.0	49.0	0.014	0.04	0.00	0.00	0.00	0.65	0.03	0.00	0.00	0.02
					Upland Mixed	1.628	0.0	38.6	0.006	0.04	0.00	0.00	0.00	0.65	0.03	0.00	0.00	0.01
	EL 01-02e	None	None	2	Pasture	1.355	0.0	68.6	0.053	0.30	0.00	0.00	0.00	0.25	0.07	0.00	0.00	0.22
					Upland Mixed	0.033	0.0	69.1	0.055	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Wet Prairies	10.702	0.0	73.0	0.071	3.12	0.00	0.00	0.00	0.25	0.78	1.00	2.34	0.00
					Wetlands	1.077	0.0	77.0	0.092	0.41	0.00	0.00	0.00	0.25	0.10	1.00	0.31	0.00
	EL 01-02f	None	None	1	Citrus Groves	12.572	0.0	43.0	0.009	0.47	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.42
					Upland Mixed	5.205	0.0	66.3	0.046	0.99	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.89
					Upland Nonforested	37.573	0.0	43.2	0.009	1.43	0.00	0.00	0.00	0.10	0.14	0.00	0.00	1.28
					Wet Prairies	19.360	0.0	73.0	0.071	5.65	0.00	0.00	0.00	0.10	0.57	1.00	5.09	0.00
	EL 01-03a	None	None	5	Nurseries	1.381	0.0	49.0	0.014	0.08	0.00	0.00	0.00	0.80	0.07	0.00	0.00	0.02
	EL 01-03c	None	None	1	Citrus Groves	6.851	0.0	43.0	0.009	0.25	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.23
	EL 01-03d	None	None	3	Citrus Groves	5.700	0.0	43.0	0.009	0.21	0.00	0.00	0.00	0.50	0.11	0.00	0.00	0.11
					Pasture	3.846	0.0	49.0	0.014	0.23	0.00	0.00	0.00	0.50	0.11	0.00	0.00	0.11
					Upland Mixed	2.662	0.0	44.1	0.010	0.11	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
					Wet Prairies	1.709	0.0	73.0	0.071	0.50	0.00	0.00	0.00	0.50	0.25	1.00	0.25	0.00
	EL 01-03e	None	None	0	Pasture	3.262	0.0	83.7	0.147	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.99
					Upland Mixed	4.651	0.0	38.2	0.006	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
					Wet Prairies	2.470	0.0	73.0	0.071	0.72	0.00	0.00	0.00	0.00	0.00	1.00	0.72	0.00
					Wetlands	0.564	0.0	77.0	0.092	0.21	0.00	0.00	0.00	0.00	0.00	1.00	0.21	0.00
	EL 01-03f	None	None	2	LDR	4.183	0.0	45.8	0.011	0.19	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.15
					Pasture	16.772	0.0	56.1	0.024	1.65	0.00	0.00	0.00	0.25	0.41	0.00	0.00	1.24
					Wet Prairies	18.601	0.0	73.0	0.071	5.43	0.00	0.00	0.00	0.25	1.36	1.00	4.07	0.00
	EL 01-03g	None	None	2	Pasture	3.113	0.0	53.2	0.020	0.25	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.19
					Upland Hardwood	3.782	0.0	35.8	0.005	0.07	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.05
					Wet Prairies	15.902	0.0	73.0	0.071	4.64	0.00	0.00	0.00	0.25	1.16	1.00	3.48	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	EL 01-04a	None	None	5	Nurseries	3.250	0.0	49.0	0.014	0.19	0.00	0.00	0.00	0.80	0.15	0.00	0.00	0.04
					Pasture	0.561	0.0	49.0	0.014	0.03	0.00	0.00	0.00	0.80	0.03	0.00	0.00	0.01
	EL 01-04c	None	None	3	Citrus Groves	7.244	0.0	43.0	0.009	0.27	0.00	0.00	0.00	0.50	0.13	0.00	0.00	0.13
	EL 01-04d	None	None	5	Citrus Groves	0.251	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.80	0.01	0.00	0.00	0.00
					LDR	4.309	0.0	46.2	0.012	0.21	0.00	0.00	0.00	0.80	0.17	0.00	0.00	0.04
					Pasture	34.714	0.0	58.6	0.028	4.03	0.00	0.00	0.00	0.80	3.22	0.00	0.00	0.81
					Upland Mixed	4.581	0.0	30.4	0.002	0.05	0.00	0.00	0.00	0.80	0.04	0.00	0.00	0.01
					Wet Prairies	1.640	0.0	73.0	0.071	0.48	0.00	0.00	0.00	0.80	0.38	1.00	0.10	0.00
	EL 01-04e	None	None	2	LDR	5.686	0.0	45.8	0.011	0.26	0.00	0.00	0.00	0.25	0.07	0.00	0.00	0.20
					Pasture	20.103	0.0	55.6	0.023	1.91	0.00	0.00	0.00	0.25	0.48	0.00	0.00	1.43
					Wet Prairies	13.586	0.0	73.0	0.071	3.97	0.00	0.00	0.00	0.25	0.99	1.00	2.97	0.00
	EL 01-05b	None	None	6	LDR	9.305	0.0	45.8	0.011	0.43	0.00	0.00	0.00	0.90	0.39	0.00	0.00	0.04
					Pasture	12.879	0.0	55.3	0.022	1.19	0.00	0.00	0.00	0.90	1.07	0.00	0.00	0.12
					Upland Mixed	8.039	0.0	30.0	0.002	0.08	0.00	0.00	0.00	0.90	0.07	0.00	0.00	0.01
					Wet Prairies	0.001	0.0	73.0	0.071	0.00	0.00	0.00	0.00	0.90	0.00	1.00	0.00	0.00
	EL 01-05c	None	None	2	LDR	7.406	0.0	48.5	0.014	0.43	0.00	0.00	0.00	0.25	0.11	0.00	0.00	0.32
					Pasture	36.763	0.0	50.1	0.016	2.36	0.00	0.00	0.00	0.25	0.59	0.00	0.00	1.77
					Wet Prairies	18.165	0.0	73.0	0.071	5.30	0.00	0.00	0.00	0.25	1.33	1.00	3.98	0.00
	EL 01-06a	None	None	2	Citrus Groves	3.172	0.0	43.0	0.009	0.12	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.09
					LDR	2.216	0.0	45.8	0.011	0.10	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.08
					Pasture	3.656	0.0	49.0	0.014	0.22	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.16
					Upland Mixed	0.552	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
	EL 02-01	None	None	1	Citrus Groves	37.563	0.0	48.7	0.014	2.19	0.00	0.00	0.00	0.10	0.22	0.00	0.00	1.97
					LDR	0.519	0.0	45.8	0.011	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.02
					Nurseries	29.274	0.0	51.3	0.017	2.06	0.00	0.00	0.00	0.10	0.21	0.00	0.00	1.86
					Pasture	8.193	0.0	64.3	0.040	1.37	0.00	0.00	0.00	0.10	0.14	0.00	0.00	1.23
					Transportation	1.212	0.0	60.8	0.032	0.16	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.15
					Upland Nonforested	7.486	0.0	43.0	0.009	0.28	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.25
					Wet Prairies	41.001	0.0	73.0	0.071	11.97	0.00	0.00	0.00	0.10	1.20	1.00	10.77	0.00
					Wetlands	24.067	0.0	77.0	0.092	9.15	0.00	0.00	0.00	0.10	0.92	1.00	8.24	0.00
	EL 02-02a	None	None	2	Citrus Groves	0.396	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Nurseries	8.593	0.0	49.1	0.014	0.51	0.00	0.00	0.00	0.25	0.13	0.00	0.00	0.39
	EL 02-02b	None	None	3	Citrus Groves	10.619	0.0	43.0	0.009	0.39	0.00	0.00	0.00	0.50	0.20	0.00	0.00	0.20
					LDR	1.284	0.0	45.8	0.011	0.06	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					Nurseries	0.249	0.0	49.0	0.014	0.01	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
					Pine Flatwoods	4.336	0.0	30.0	0.002	0.04	0.00	0.00	0.00	0.50	0.02	0.00	0.00	0.02
					Transportation	1.304	0.0	59.7	0.030	0.16	0.00	0.00	0.00	0.50	0.08	0.00	0.00	0.08
					Upland Nonforested	5.529	0.0	43.0	0.009	0.21	0.00	0.00	0.00	0.50	0.10	0.00	0.00	0.10
					Wet Prairies	3.097	0.0	73.0	0.071	0.90	0.00	0.00	0.00	0.50	0.45	1.00	0.45	0.00
					Wetlands	2.272	0.0	77.0	0.092	0.86	0.00	0.00	0.00	0.50	0.43	1.00	0.43	0.00
	EL 02-02c	None	None	3	Citrus Groves	4.320	0.0	43.0	0.009	0.16	0.00	0.00	0.00	0.50	0.08	0.00	0.00	0.08
					LDR	6.150	0.0	55.5	0.023	0.58	0.00	0.00	0.00	0.50	0.29	0.00	0.00	0.29
					Nurseries	2.316	0.0	49.0	0.014	0.14	0.00	0.00	0.00	0.50	0.07	0.00	0.00	0.07
					Pasture	15.177	0.0	66.8	0.048	2.99	0.00	0.00	0.00	0.50	1.50	0.00	0.00	1.50
					Transportation	2.304	0.0	62.8	0.037	0.35	0.00	0.00	0.00	0.50	0.18	0.00	0.00	0.18
					Upland Nonforested	4.649	0.0	43.0	0.009	0.17	0.00	0.00	0.00	0.50	0.09	0.00	0.00	0.09
	EL 02-02d	None	None	3	Nurseries	3.615	0.0	59.4	0.029	0.44	0.00	0.00	0.00	0.50	0.22	0.00	0.00	0.22
					Wetlands	0.052	0.0	77.0	0.092	0.02	0.00	0.00	0.00	0.50	0.01	1.00	0.01	0.00
	EL 02-02e	None	None	1	Citrus Groves	16.677	0.0	46.1	0.012	0.79	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.71
					Wet Prairies	4.807	0.0	73.0	0.071	1.40	0.00	0.00	0.00	0.10	0.14	1.00	1.26	0.00
	EL 02-03a	None	None	2	Citrus Groves	19.851	0.0	43.0	0.009	0.74	0.00	0.00	0.00	0.25	0.18	0.00	0.00	0.55
					LDR	3.718	0.0	48.3	0.014	0.21	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.16
					Pasture	0.087	0.0	49.0	0.014	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Transportation	0.843	0.0	61.2	0.033	0.12	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.09
					Upland Nonforested	0.265	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Wet Prairies	2.682	0.0	73.0	0.071	0.78	0.00	0.00	0.00	0.25	0.20	1.00	0.59	0.00
	EL 02-03b	None	None	2	Citrus Groves	2.307	0.0	43.0	0.009	0.09	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.06

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	EL 02-03b	None	None	2	LDR	0.280	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Pasture	16.742	0.0	70.2	0.058	4.04	0.00	0.00	0.00	0.25	1.01	0.00	0.00	3.03
					Shrub and Brushland	0.401	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Upland Nonforested	1.545	0.0	43.0	0.009	0.06	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
	EL 02-03c	None	None	2	Citrus Groves	0.130	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					LDR	1.321	0.0	55.2	0.022	0.12	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.09
					Pasture	3.028	0.0	84.0	0.150	1.88	0.00	0.00	0.00	0.25	0.47	0.00	0.00	1.41
					Upland Mixed	0.169	0.0	77.0	0.092	0.06	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.05
	EL 03-01	None	None	0	Citrus Groves	9.537	0.0	49.5	0.015	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
					Pasture	21.816	0.0	81.6	0.127	11.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.44
					Upland Hardwood	10.988	0.0	57.3	0.026	1.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17
					Upland Mixed	39.322	0.0	60.7	0.032	5.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.23
					Upland Nonforested	20.587	0.0	44.9	0.010	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
					Wet Prairies	124.305	0.0	73.0	0.071	36.28	0.00	0.00	0.00	0.00	0.00	1.00	36.28	0.00
					Wetlands	0.915	0.0	77.0	0.092	0.35	0.00	0.00	0.00	0.00	0.00	1.00	0.35	0.00
	EL 03-02a	None	None	5	Pasture	10.988	0.0	50.6	0.016	0.73	0.00	0.00	0.00	0.80	0.59	0.00	0.00	0.15
					Upland Hardwood	6.986	0.0	30.3	0.002	0.07	0.00	0.00	0.00	0.80	0.06	0.00	0.00	0.01
					Wet Prairies	5.323	0.0	73.0	0.071	1.55	0.00	0.00	0.00	0.80	1.24	1.00	0.31	0.00
	EL 03-02b	None	None	1	Citrus Groves	24.930	0.0	43.5	0.009	0.97	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.87
					LDR	34.101	0.0	48.8	0.014	2.00	0.00	0.00	0.00	0.10	0.20	0.00	0.00	1.80
					MDR	1.156	0.0	52.4	0.019	0.09	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.08
					Pasture	113.364	0.0	57.5	0.026	12.26	0.00	0.00	0.00	0.10	1.23	0.00	0.00	11.04
					Transportation	6.457	0.0	61.2	0.033	0.89	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.80
					Upland Hardwood	27.639	0.0	44.8	0.010	1.18	0.00	0.00	0.00	0.10	0.12	0.00	0.00	1.06
					Upland Mixed	42.595	0.0	67.5	0.050	8.74	0.00	0.00	0.00	0.10	0.87	0.00	0.00	7.87
					Upland Nonforested	24.950	0.0	52.5	0.019	1.92	0.00	0.00	0.00	0.10	0.19	0.00	0.00	1.73
					Wet Prairies	88.119	0.0	73.0	0.071	25.72	0.00	0.00	0.00	0.10	2.57	1.00	23.15	0.00
					Wetlands	49.616	0.0	77.0	0.092	18.87	0.00	0.00	0.00	0.10	1.89	1.00	16.98	0.00
	EL 03-02c	None	None	1	Upland Mixed	7.586	0.0	77.0	0.092	2.88	0.00	0.00	0.00	0.10	0.29	0.00	0.00	2.59
					Upland Nonforested	0.226	0.0	45.1	0.011	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Wetlands	2.208	0.0	77.0	0.092	0.84	0.00	0.00	0.00	0.10	0.08	1.00	0.76	0.00
	EL 03-02d	None	None	6	Pasture	2.645	0.0	50.9	0.017	0.18	0.00	0.00	0.00	0.90	0.16	0.00	0.00	0.02
					Upland Mixed	1.438	0.0	33.7	0.004	0.02	0.00	0.00	0.00	0.90	0.02	0.00	0.00	0.00
	EL 03-03b	None	None	6	Pasture	2.824	0.0	49.0	0.014	0.17	0.00	0.00	0.00	0.90	0.15	0.00	0.00	0.02
					Upland Hardwood	0.136	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
					Wet Prairies	0.221	0.0	73.0	0.071	0.06	0.00	0.00	0.00	0.90	0.06	1.00	0.01	0.00
	EL 03-03c	None	None	3	Pasture	1.030	0.0	49.0	0.014	0.06	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					Upland Hardwood	0.895	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
	EL 03-03d	None	None	5	Pasture	7.196	0.0	50.5	0.016	0.48	0.00	0.00	0.00	0.80	0.38	0.00	0.00	0.10
					Upland Hardwood	0.066	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
					Wet Prairies	0.820	0.0	73.0	0.071	0.24	0.00	0.00	0.00	0.80	0.19	1.00	0.05	0.00
	EL 03-03f	None	None	4	Citrus Groves	5.512	0.0	43.0	0.009	0.20	0.00	0.00	0.00	0.65	0.13	0.00	0.00	0.07
					Upland Mixed	4.890	0.0	54.6	0.021	0.43	0.00	0.00	0.00	0.65	0.28	0.00	0.00	0.15
					Wet Prairies	1.973	0.0	73.0	0.071	0.58	0.00	0.00	0.00	0.65	0.37	1.00	0.20	0.00
	EL 03-03g	None	None	4	Citrus Groves	10.893	0.0	43.0	0.009	0.40	0.00	0.00	0.00	0.65	0.26	0.00	0.00	0.14
	EL 03-03h	None	None	6	Pasture	7.928	0.0	49.0	0.014	0.47	0.00	0.00	0.00	0.90	0.42	0.00	0.00	0.05
					Upland Mixed	0.650	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.90	0.01	0.00	0.00	0.00
	EL 03-04c	None	None	2	Pasture	5.240	0.0	49.0	0.014	0.31	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.23
					Upland Mixed	1.403	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
	EL 04-01	None	None	0	LDR	0.804	0.0	45.8	0.011	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
					Pasture	14.586	0.0	49.2	0.015	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
					Transportation	2.407	0.0	39.0	0.006	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
					Upland Mixed	54.978	0.0	30.4	0.002	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56
					Wet Prairies	21.759	0.0	73.0	0.071	6.35	0.00	0.00	0.00	0.00	0.00	1.00	6.35	0.00
	EL 04-02a	None	None	0	LDR	15.905	0.0	46.6	0.012	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79
					Pasture	10.844	0.0	50.7	0.016	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73
					Transportation	1.694	0.0	78.4	0.101	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	EL 04-02a	None	None	0	Upland Mixed	14.733	0.0	33.1	0.003	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21
					Wet Prairies	61.691	0.0	73.0	0.071	18.01	0.00	0.00	0.00	0.00	0.00	1.00	18.01	0.00
	EL 04-03a	None	None	0	Pasture	15.553	0.0	53.4	0.020	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27
					Upland Mixed	15.003	0.0	33.4	0.004	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
					Wet Prairies	32.171	0.0	73.0	0.071	9.39	0.00	0.00	0.00	0.00	0.00	1.00	9.39	0.00
	EL 04-03b	None	None	2	LDR	6.902	0.0	47.3	0.013	0.36	0.00	0.00	0.00	0.25	0.09	0.00	0.00	0.27
					Upland Hardwood	2.217	0.0	38.4	0.006	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					Upland Mixed	3.476	0.0	51.3	0.017	0.25	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.18
					Upland Nonforested	7.223	0.0	43.6	0.009	0.28	0.00	0.00	0.00	0.25	0.07	0.00	0.00	0.21
					Wet Prairies	11.669	0.0	73.0	0.071	3.41	0.00	0.00	0.00	0.25	0.85	1.00	2.55	0.00
	EL 04-04b	None	None	5	Pasture	22.440	0.0	54.3	0.021	1.94	0.00	0.00	0.00	0.80	1.55	0.00	0.00	0.39
					Upland Mixed	4.704	0.0	32.7	0.003	0.06	0.00	0.00	0.00	0.80	0.05	0.00	0.00	0.01
					Wet Prairies	5.278	0.0	73.0	0.071	1.54	0.00	0.00	0.00	0.80	1.23	1.00	0.31	0.00
	EL 04-04d	None	None	4	Upland Mixed	8.229	0.0	37.5	0.005	0.19	0.00	0.00	0.00	0.65	0.12	0.00	0.00	0.06
					Wet Prairies	4.119	0.0	73.0	0.071	1.20	0.00	0.00	0.00	0.65	0.78	1.00	0.42	0.00
	EL 04-05b	None	None	5	Pasture	4.930	0.0	49.1	0.014	0.29	0.00	0.00	0.00	0.80	0.24	0.00	0.00	0.06
					Upland Mixed	11.392	0.0	32.2	0.003	0.15	0.00	0.00	0.00	0.80	0.12	0.00	0.00	0.03
					Wet Prairies	6.624	0.0	73.0	0.071	1.93	0.00	0.00	0.00	0.80	1.55	1.00	0.39	0.00
	EL 04-06b	None	None	5	Upland Mixed	8.737	0.0	36.4	0.005	0.18	0.00	0.00	0.00	0.80	0.14	0.00	0.00	0.04
					Wet Prairies	3.882	0.0	73.0	0.071	1.13	0.00	0.00	0.00	0.80	0.91	1.00	0.23	0.00
	ELW 01-01	None	None	4	LDR	3.313	0.0	64.3	0.040	0.55	0.00	0.00	0.00	0.65	0.36	0.00	0.00	0.19
					Pasture	9.734	0.0	49.5	0.015	0.60	0.00	0.00	0.00	0.65	0.39	0.00	0.00	0.21
					Transportation	1.702	0.0	74.1	0.075	0.53	0.00	0.00	0.00	0.65	0.34	0.00	0.00	0.19
					Upland Hardwood	17.815	0.0	37.4	0.005	0.40	0.00	0.00	0.00	0.65	0.26	0.00	0.00	0.14
					Upland Mixed	17.545	0.0	66.0	0.045	3.26	0.00	0.00	0.00	0.65	2.12	0.00	0.00	1.14
					Upland Nonforested	4.065	0.0	82.0	0.130	2.19	0.00	0.00	0.00	0.65	1.43	0.00	0.00	0.77
					Wet Prairies	41.322	0.0	73.0	0.071	12.06	0.00	0.00	0.00	0.65	7.84	1.00	4.22	0.00
					Wetlands	3.529	0.0	77.0	0.092	1.34	0.00	0.00	0.00	0.65	0.87	1.00	0.47	0.00
	ELW 01-02a	None	None	2	Pasture	11.583	0.0	49.0	0.014	0.69	0.00	0.00	0.00	0.25	0.17	0.00	0.00	0.52
	ELW 01-02b	None	None	0	LDR	3.271	0.0	80.7	0.118	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60
					Upland Mixed	4.371	0.0	77.0	0.092	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66
					Upland Nonforested	13.338	0.0	59.8	0.030	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66
					Wet Prairies	11.159	0.0	73.0	0.071	3.26	0.00	0.00	0.00	0.00	0.00	1.00	3.26	0.00
	ELW 01-03a	None	None	8	Upland Nonforested	6.981	0.0	43.0	0.009	0.26	0.00	0.00	0.00	1.00	0.26	0.00	0.00	0.00
	Elza 01-01	None	None	3	Citrus Groves	30.164	0.0	50.5	0.016	2.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	1.00
					LDR	8.367	0.0	52.6	0.019	0.65	0.00	0.00	0.00	0.50	0.32	0.00	0.00	0.32
					Pasture	5.460	0.0	52.1	0.018	0.41	0.00	0.00	0.00	0.50	0.20	0.00	0.00	0.20
					Transportation	1.369	0.0	69.7	0.056	0.32	0.00	0.00	0.00	0.50	0.16	0.00	0.00	0.16
					Upland Mixed	4.079	0.0	67.6	0.050	0.85	0.00	0.00	0.00	0.50	0.42	0.00	0.00	0.42
					Upland Nonforested	3.840	0.0	58.9	0.029	0.45	0.00	0.00	0.00	0.50	0.23	0.00	0.00	0.23
					Wet Prairies	4.814	0.0	73.0	0.071	1.41	0.00	0.00	0.00	0.50	0.70	1.00	0.70	0.00
					Wetlands	2.694	0.0	77.0	0.092	1.02	0.00	0.00	0.00	0.50	0.51	1.00	0.51	0.00
	Elza 01-2a	None	None	2	Citrus Groves	47.315	0.0	43.7	0.010	1.86	0.00	0.00	0.00	0.25	0.47	0.00	0.00	1.40
					Transportation	0.165	0.0	69.7	0.056	0.04	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.03
					Wetlands	10.762	0.0	77.0	0.092	4.09	0.00	0.00	0.00	0.25	1.02	1.00	3.07	0.00
	Elza 01-2b	None	None	1	Citrus Groves	13.015	0.0	49.0	0.014	0.77	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.70
					LDR	1.593	0.0	59.4	0.029	0.19	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.17
					Upland Mixed	3.059	0.0	73.4	0.072	0.91	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.82
					Upland Nonforested	2.094	0.0	76.7	0.090	0.78	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.70
					Wet Prairies	8.923	0.0	73.0	0.071	2.60	0.00	0.00	0.00	0.10	0.26	1.00	2.34	0.00
	HL 01-01	None	None	0	Citrus Groves	6.421	0.0	45.7	0.011	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
					LDR	0.538	0.0	53.6	0.020	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
					Pasture	18.888	0.0	62.6	0.036	2.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85
					Upland Hardwood	3.836	0.0	41.0	0.007	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
					Upland Mixed	3.497	0.0	77.0	0.092	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33
					Wet Prairies	40.720	0.0	73.0	0.071	11.89	0.00	0.00	0.00	0.00	0.00	1.00	11.89	0.00
					Wetlands	9.938	0.0	77.0	0.092	3.78	0.00	0.00	0.00	0.00	0.00	1.00	3.78	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	HL 01-02a	None	None	1	Citrus Groves	16.370	0.0	45.0	0.010	0.71	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.64
					Nurseries	0.665	0.0	49.0	0.014	0.04	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.04
					Pasture	5.053	0.0	62.2	0.036	0.75	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.67
					Wet Prairies	26.507	0.0	73.0	0.071	7.74	0.00	0.00	0.00	0.10	0.77	1.00	6.96	0.00
					Wetlands	0.331	0.0	77.0	0.092	0.13	0.00	0.00	0.00	0.10	0.01	1.00	0.11	0.00
	HL 02-01	None	None	0	Citrus Groves	8.012	0.0	44.9	0.010	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
					LDR	31.257	0.0	56.4	0.024	3.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.14
					Pasture	1.316	0.0	49.0	0.014	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
					Transportation	6.292	0.0	69.9	0.057	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49
					Upland Nonforested	45.649	0.0	52.2	0.018	3.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.44
					Wet Prairies	63.676	0.0	73.0	0.071	18.59	0.00	0.00	0.00	0.00	0.00	1.00	18.59	0.00
					Wetlands	8.301	0.0	77.0	0.092	3.16	0.00	0.00	0.00	0.00	0.00	1.00	3.16	0.00
	HL 02-02a	None	None	3	Citrus Groves	6.637	0.0	43.0	0.009	0.25	0.00	0.00	0.00	0.50	0.12	0.00	0.00	0.12
					LDR	4.820	0.0	74.4	0.077	1.53	0.00	0.00	0.00	0.50	0.76	0.00	0.00	0.76
					Transportation	0.679	0.0	62.6	0.036	0.10	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
					Upland Nonforested	9.493	0.0	50.5	0.016	0.63	0.00	0.00	0.00	0.50	0.31	0.00	0.00	0.31
					Wetlands	4.205	0.0	77.0	0.092	1.60	0.00	0.00	0.00	0.50	0.80	1.00	0.80	0.00
	HL 02-02b	None	None	4	Citrus Groves	0.147	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
					LDR	1.107	0.0	66.4	0.046	0.21	0.00	0.00	0.00	0.65	0.14	0.00	0.00	0.07
					Transportation	0.507	0.0	70.6	0.060	0.13	0.00	0.00	0.00	0.65	0.08	0.00	0.00	0.04
					Upland Nonforested	7.351	0.0	50.0	0.015	0.47	0.00	0.00	0.00	0.65	0.30	0.00	0.00	0.16
					Wet Prairies	1.160	0.0	73.0	0.071	0.34	0.00	0.00	0.00	0.65	0.22	1.00	0.12	0.00
	HL 02-02c	None	None	0	Upland Mixed	4.382	0.0	77.0	0.092	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67
					Upland Nonforested	5.333	0.0	48.6	0.014	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31
					Wet Prairies	26.340	0.0	73.0	0.071	7.69	0.00	0.00	0.00	0.00	0.00	1.00	7.69	0.00
					Wetlands	2.163	0.0	77.0	0.092	0.82	0.00	0.00	0.00	0.00	0.00	1.00	0.82	0.00
	HL 02-03a	None	None	2	Citrus Groves	17.446	0.0	43.0	0.009	0.65	0.00	0.00	0.00	0.25	0.16	0.00	0.00	0.49
					LDR	1.400	0.0	78.4	0.100	0.58	0.00	0.00	0.00	0.25	0.15	0.00	0.00	0.44
					Nurseries	4.169	0.0	49.0	0.014	0.25	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.19
					Pine Flatwoods	7.504	0.0	30.6	0.003	0.08	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.06
					Transportation	0.721	0.0	62.6	0.037	0.11	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.08
					Upland Nonforested	0.110	0.0	82.0	0.130	0.06	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					Wetlands	12.763	0.0	77.0	0.092	4.85	0.00	0.00	0.00	0.25	1.21	1.00	3.64	0.00
	HL 02-04a	None	None	4	Citrus Groves	21.587	0.0	43.0	0.009	0.80	0.00	0.00	0.00	0.65	0.52	0.00	0.00	0.28
					LDR	5.152	0.0	45.8	0.011	0.24	0.00	0.00	0.00	0.65	0.16	0.00	0.00	0.08
					Transportation	1.919	0.0	69.5	0.056	0.45	0.00	0.00	0.00	0.65	0.29	0.00	0.00	0.16
	LF 01-01	None	None	1	Citrus Groves	2.873	0.0	43.0	0.009	0.11	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.10
					LDR	7.725	0.0	60.3	0.031	0.99	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.89
					Pasture	12.685	0.0	51.0	0.017	0.88	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.79
					Recreational	0.475	0.0	45.6	0.011	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.02
					Transportation	0.122	0.0	69.7	0.056	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03
					Upland Nonforested	29.748	0.0	61.1	0.033	4.06	0.00	0.00	0.00	0.10	0.41	0.00	0.00	3.65
					Wetlands	15.573	0.0	77.0	0.092	5.92	0.00	0.00	0.00	0.10	0.59	1.00	5.33	0.00
	LF 01-02a	None	None	1	Citrus Groves	0.087	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					LDR	0.041	0.0	48.5	0.014	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Pasture	1.853	0.0	49.0	0.014	0.11	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.10
					Upland Nonforested	0.678	0.0	43.0	0.009	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.02
	LF 01-02b	None	None	2	LDR	4.271	0.0	49.0	0.014	0.25	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.19
					Pasture	8.134	0.0	49.5	0.015	0.50	0.00	0.00	0.00	0.25	0.13	0.00	0.00	0.38
					Upland Nonforested	0.514	0.0	67.4	0.049	0.10	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.08
					Wet Prairies	2.754	0.0	73.0	0.071	0.80	0.00	0.00	0.00	0.25	0.20	1.00	0.60	0.00
	LF 01-03a	None	None	4	Citrus Groves	1.470	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.65	0.04	0.00	0.00	0.02
					LDR	0.073	0.0	48.5	0.014	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
					Upland Nonforested	2.799	0.0	43.0	0.009	0.10	0.00	0.00	0.00	0.65	0.07	0.00	0.00	0.04
	LYS 00-01	None	None	1	Citrus Groves	8.326	0.0	43.0	0.009	0.31	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.28
					LDR	16.055	0.0	47.4	0.013	0.85	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.77
					Nurseries	21.605	0.0	49.0	0.014	1.29	0.00	0.00	0.00	0.10	0.13	0.00	0.00	1.16

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	LYS 00-01	None	None	1	Pasture	59.627	0.0	63.9	0.039	9.73	0.00	0.00	0.00	0.10	0.97	0.00	0.00	8.75
					Pine Flatwoods	62.056	0.0	38.6	0.006	1.55	0.00	0.00	0.00	0.10	0.16	0.00	0.00	1.40
					Recreational	4.725	0.0	42.0	0.008	0.16	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.15
					Shrub and Brushland	3.788	0.0	52.1	0.018	0.28	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.26
					Upland Hardwood	11.776	0.0	77.0	0.092	4.48	0.00	0.00	0.00	0.10	0.45	0.00	0.00	4.03
					Upland Mixed	21.553	0.0	71.8	0.065	5.81	0.00	0.00	0.00	0.10	0.58	0.00	0.00	5.23
					Upland Nonforested	104.380	0.0	56.0	0.024	10.16	0.00	0.00	0.00	0.10	1.02	0.00	0.00	9.15
					Wet Prairies	577.368	0.0	73.0	0.071	168.53	0.00	0.00	0.00	0.10	16.85	1.00	151.68	0.00
					Wetlands	395.007	0.0	77.0	0.092	150.20	0.00	0.00	0.00	0.10	15.02	1.00	135.18	0.00
	LYS 00-02a	None	None	1	LDR	0.146	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Pine Flatwoods	1.601	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
	LYS 01-01	None	None	1	LDR	0.117	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Upland Nonforested	17.641	0.0	43.0	0.009	0.66	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.59
	LYS 02-01a	None	None	5	Upland Nonforested	5.965	0.0	43.6	0.009	0.23	0.00	0.00	0.00	0.80	0.19	0.00	0.00	0.05
					Wet Prairies	1.184	0.0	73.0	0.071	0.35	0.00	0.00	0.00	0.80	0.28	1.00	0.07	0.00
	LYS 02-02a	None	None	4	LDR	2.859	0.0	45.8	0.011	0.13	0.00	0.00	0.00	0.65	0.09	0.00	0.00	0.05
					Upland Nonforested	6.112	0.0	50.2	0.016	0.40	0.00	0.00	0.00	0.65	0.26	0.00	0.00	0.14
					Wet Prairies	1.071	0.0	73.0	0.071	0.31	0.00	0.00	0.00	0.65	0.20	1.00	0.11	0.00
	LYS 02-02b	None	None	2	LDR	0.187	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Upland Nonforested	2.321	0.0	43.0	0.009	0.09	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.06
	LYS 02-03a	None	None	2	LDR	13.755	0.0	45.8	0.011	0.64	0.00	0.00	0.00	0.25	0.16	0.00	0.00	0.48
					Upland Nonforested	0.216	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
	LYS 02-03b	None	None	5	LDR	6.738	0.0	46.0	0.011	0.32	0.00	0.00	0.00	0.80	0.26	0.00	0.00	0.06
					Upland Nonforested	10.485	0.0	52.9	0.019	0.83	0.00	0.00	0.00	0.80	0.67	0.00	0.00	0.17
					Wet Prairies	1.417	0.0	73.0	0.071	0.41	0.00	0.00	0.00	0.80	0.33	1.00	0.08	0.00
	LYS 02-04a	None	None	1	LDR	5.677	0.0	45.8	0.011	0.26	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.24
					Upland Nonforested	1.220	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.04
	LYS 02-04b	None	None	5	LDR	6.571	0.0	45.8	0.011	0.30	0.00	0.00	0.00	0.80	0.24	0.00	0.00	0.06
					Upland Nonforested	1.323	0.0	43.5	0.009	0.05	0.00	0.00	0.00	0.80	0.04	0.00	0.00	0.01
	LYS 02-05a	None	None	1	LDR	4.254	0.0	45.8	0.011	0.20	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.18
					Upland Nonforested	0.059	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
	LYS 02-06a	None	None	1	LDR	4.931	0.0	45.8	0.011	0.23	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.21
	LYS 03-01a	None	None	5	Upland Nonforested	5.472	0.0	43.0	0.009	0.20	0.00	0.00	0.00	0.80	0.16	0.00	0.00	0.04
	LYS 04-01a	None	None	7	LDR	7.956	0.0	45.8	0.011	0.37	0.00	0.00	0.00	1.00	0.37	0.00	0.00	0.00
					Pine Flatwoods	1.876	0.0	30.0	0.002	0.02	0.00	0.00	0.00	1.00	0.02	0.00	0.00	0.00
					Upland Nonforested	4.067	0.0	43.0	0.009	0.15	0.00	0.00	0.00	1.00	0.15	0.00	0.00	0.00
					Wet Prairies	0.810	0.0	73.0	0.071	0.24	0.00	0.00	0.00	1.00	0.24	1.00	0.00	0.00
	LYS 04-02a	None	None	7	LDR	21.777	0.0	46.0	0.011	1.03	0.00	0.00	0.00	1.00	1.03	0.00	0.00	0.00
					Upland Nonforested	4.105	0.0	43.0	0.009	0.15	0.00	0.00	0.00	1.00	0.15	0.00	0.00	0.00
					Wet Prairies	1.598	0.0	73.0	0.071	0.47	0.00	0.00	0.00	1.00	0.47	1.00	0.00	0.00
	LYS 04-03a	None	None	3	LDR	0.296	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
					Upland Nonforested	3.147	0.0	43.0	0.009	0.12	0.00	0.00	0.00	0.50	0.06	0.00	0.00	0.06
	LYS 05-01a	None	None	1	LDR	5.611	0.0	45.8	0.011	0.26	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.23
					Pine Flatwoods	1.528	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Upland Nonforested	0.758	0.0	43.0	0.009	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03
	LYS 05-02a	None	None	6	LDR	10.148	0.0	45.8	0.011	0.47	0.00	0.00	0.00	0.90	0.42	0.00	0.00	0.05
					Pine Flatwoods	1.404	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.90	0.01	0.00	0.00	0.00
	LYS 05-03a	None	None	2	LDR	9.189	0.0	45.8	0.011	0.43	0.00	0.00	0.00	0.25	0.11	0.00	0.00	0.32
					Pine Flatwoods	0.004	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Upland Nonforested	0.788	0.0	43.0	0.009	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
	LYS 05-04a	None	None	3	LDR	10.086	0.0	45.8	0.011	0.47	0.00	0.00	0.00	0.50	0.23	0.00	0.00	0.23
					Pine Flatwoods	2.809	0.0	30.0	0.002	0.03	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
					Upland Hardwood	2.555	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
	LYS 05-05a	None	None	11	LDR	4.199	0.0	45.8	0.011	0.19	0.00	0.00	0.00	1.00	0.19	0.00	0.00	0.00
					Upland Hardwood	11.320	0.0	30.0	0.002	0.11	0.00	0.00	0.00	1.00	0.11	0.00	0.00	0.00
					Upland Mixed	6.871	0.0	30.0	0.002	0.07	0.00	0.00	0.00	1.00	0.07	0.00	0.00	0.00
	LYS 06-01a	None	None	5	LDR	11.373	0.0	52.6	0.019	0.88	0.00	0.00	0.00	0.80	0.71	0.00	0.00	0.18

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	LYS 06-01a	None	None	5	Pine Flatwoods	2.295	0.0	31.3	0.003	0.03	0.00	0.00	0.00	0.80	0.02	0.00	0.00	0.01
					Upland Nonforested	0.088	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
	LYS 07-01a	None	None	1	LDR	13.261	0.0	51.6	0.018	0.96	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.86
					Pasture	0.525	0.0	49.0	0.014	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03
					Pine Flatwoods	0.157	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
	LYS 07-02a	None	None	1	LDR	3.671	0.0	56.9	0.025	0.38	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.34
	LYS 07-03a	None	None	6	Citrus Groves	2.348	0.0	43.0	0.009	0.09	0.00	0.00	0.00	0.90	0.08	0.00	0.00	0.01
					LDR	13.703	0.0	51.0	0.017	0.94	0.00	0.00	0.00	0.90	0.85	0.00	0.00	0.09
					Pasture	0.329	0.0	49.0	0.014	0.02	0.00	0.00	0.00	0.90	0.02	0.00	0.00	0.00
					Upland Mixed	4.222	0.0	30.0	0.002	0.04	0.00	0.00	0.00	0.90	0.04	0.00	0.00	0.00
					Wet Prairies	2.045	0.0	73.0	0.071	0.60	0.00	0.00	0.00	0.90	0.54	1.00	0.06	0.00
	LYS 07-04a	None	None	3	LDR	4.827	0.0	45.8	0.011	0.22	0.00	0.00	0.00	0.50	0.11	0.00	0.00	0.11
					Pasture	0.766	0.0	49.0	0.014	0.05	0.00	0.00	0.00	0.50	0.02	0.00	0.00	0.02
					Upland Mixed	2.001	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
	LYS 07-05a	None	None	4	LDR	0.382	0.0	45.8	0.011	0.02	0.00	0.00	0.00	0.65	0.01	0.00	0.00	0.01
					Upland Mixed	4.256	0.0	30.0	0.002	0.04	0.00	0.00	0.00	0.65	0.03	0.00	0.00	0.01
					Upland Nonforested	0.056	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
	LYS 07-06a	None	None	6	LDR	0.119	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
					Upland Mixed	2.235	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.90	0.02	0.00	0.00	0.00
					Upland Nonforested	2.773	0.0	43.0	0.009	0.10	0.00	0.00	0.00	0.90	0.09	0.00	0.00	0.01
	LYS 07-07a	None	None	6	LDR	0.212	0.0	45.8	0.011	0.01	0.00	0.00	0.00	0.90	0.01	0.00	0.00	0.00
					Upland Mixed	1.612	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.90	0.01	0.00	0.00	0.00
	LYS 07-08a	None	None	2	LDR	4.490	0.0	45.8	0.011	0.21	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.16
					Pasture	1.097	0.0	49.0	0.014	0.07	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.05
					Upland Mixed	0.136	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
	LYS 08-01a	None	None	2	Pine Flatwoods	7.535	0.0	35.2	0.004	0.13	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.10
					Upland Nonforested	0.137	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Wet Prairies	4.670	0.0	73.0	0.071	1.36	0.00	0.00	0.00	0.25	0.34	1.00	1.02	0.00
	LYS 08-02a	None	None	2	Pasture	1.474	0.0	49.0	0.014	0.09	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.07
					Pine Flatwoods	2.764	0.0	30.0	0.002	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					Wet Prairies	0.545	0.0	73.0	0.071	0.16	0.00	0.00	0.00	0.25	0.04	1.00	0.12	0.00
	LYS 09-01a	None	None	1	LDR	6.703	0.0	61.5	0.034	0.94	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.85
					Pasture	1.632	0.0	68.3	0.052	0.35	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.32
					Pine Flatwoods	0.508	0.0	33.0	0.003	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Upland Nonforested	6.650	0.0	45.6	0.011	0.30	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.27
					Wetlands	9.183	0.0	77.0	0.092	3.49	0.00	0.00	0.00	0.10	0.35	1.00	3.14	0.00
	LYS 09-02b	None	None	4	LDR	2.940	0.0	71.7	0.065	0.79	0.00	0.00	0.00	0.65	0.51	0.00	0.00	0.28
					Transportation	0.771	0.0	59.4	0.029	0.09	0.00	0.00	0.00	0.65	0.06	0.00	0.00	0.03
					Upland Nonforested	2.834	0.0	44.9	0.010	0.12	0.00	0.00	0.00	0.65	0.08	0.00	0.00	0.04
	LYS 09-03b	None	None	2	Citrus Groves	1.374	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					LDR	1.955	0.0	45.8	0.011	0.09	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.07
					Pasture	4.523	0.0	49.5	0.015	0.28	0.00	0.00	0.00	0.25	0.07	0.00	0.00	0.21
					Transportation	0.683	0.0	66.4	0.046	0.13	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.10
	LYS 10-01	None	None	2	Upland Nonforested	1.219	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.03
					Wet Prairies	0.603	0.0	73.0	0.071	0.18	0.00	0.00	0.00	0.25	0.04	1.00	0.13	0.00
					Wetlands	5.761	0.0	77.0	0.092	2.19	0.00	0.00	0.00	0.25	0.55	1.00	1.64	0.00
	LYS 10-02a	None	None	1	Pasture	5.169	0.0	49.0	0.014	0.31	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.28
					Wet Prairies	1.879	0.0	73.0	0.071	0.55	0.00	0.00	0.00	0.10	0.05	1.00	0.49	0.00
					Wetlands	8.191	0.0	77.0	0.092	3.11	0.00	0.00	0.00	0.10	0.31	1.00	2.80	0.00
	LYS 11-1a	None	None	4	Wet Prairies	0.779	0.0	73.0	0.071	0.23	0.00	0.00	0.00	0.65	0.15	1.00	0.08	0.00
					Wetlands	6.451	0.0	77.0	0.092	2.45	0.00	0.00	0.00	0.65	1.59	1.00	0.86	0.00
	LYS 12-01	None	None	0	Citrus Groves	34.315	0.0	43.2	0.009	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
					LDR	7.885	0.0	53.3	0.020	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
					Nurseries	3.902	0.0	50.2	0.016	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
					Pasture	2.447	0.0	49.0	0.014	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
					Transportation	1.974	0.0	75.1	0.080	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
					Upland Mixed	32.078	0.0	63.0	0.037	4.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.97

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	LYS 12-01	None	None	0	Upland Nonforested	1.453	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
					Wet Prairies	127.707	0.0	73.0	0.071	37.28	0.00	0.00	0.00	0.00	0.00	1.00	37.28	0.00
					Wetlands	21.159	0.0	77.0	0.092	8.05	0.00	0.00	0.00	0.00	0.00	1.00	8.05	0.00
	LYS 12-02a	None	None	3	Citrus Groves	0.299	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
					Pasture	6.484	0.0	49.0	0.014	0.39	0.00	0.00	0.00	0.50	0.19	0.00	0.00	0.19
					Wet Prairies	7.747	0.0	73.0	0.071	2.26	0.00	0.00	0.00	0.50	1.13	1.00	1.13	0.00
					Wetlands	10.927	0.0	77.0	0.092	4.15	0.00	0.00	0.00	0.50	2.08	1.00	2.08	0.00
	LYS 12-02b	None	None	4	Citrus Groves	0.898	0.0	43.0	0.009	0.03	0.00	0.00	0.00	0.65	0.02	0.00	0.00	0.01
					Pasture	2.384	0.0	49.0	0.014	0.14	0.00	0.00	0.00	0.65	0.09	0.00	0.00	0.05
					Wetlands	2.760	0.0	77.0	0.092	1.05	0.00	0.00	0.00	0.65	0.68	1.00	0.37	0.00
	LYS 12-02c	None	None	3	Citrus Groves	1.546	0.0	43.0	0.009	0.06	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					LDR	0.235	0.0	48.5	0.014	0.01	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
					Upland Mixed	0.043	0.0	77.0	0.092	0.02	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01
	LYS 12-02e	None	None	2	LDR	2.697	0.0	58.3	0.027	0.31	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.23
					Pasture	26.282	0.0	49.0	0.014	1.57	0.00	0.00	0.00	0.25	0.39	0.00	0.00	1.17
					Transportation	1.492	0.0	69.7	0.056	0.35	0.00	0.00	0.00	0.25	0.09	0.00	0.00	0.26
					Upland Mixed	5.592	0.0	30.0	0.002	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
		Swale	None	2	Transportation	0.824	0.0	57.2	0.026	0.09	0.20	0.00	0.02	0.25	0.02	0.00	0.00	0.05
	LYS 12-02f	None	None	7	Transportation	0.191	0.0	69.7	0.056	0.04	0.00	0.00	0.00	1.00	0.04	0.00	0.00	0.00
					Upland Mixed	0.677	0.0	30.0	0.002	0.01	0.00	0.00	0.00	1.00	0.01	0.00	0.00	0.00
	LYS 12-02g	None	None	1	Citrus Groves	12.489	0.0	43.0	0.009	0.46	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.42
					Upland Mixed	5.284	0.0	69.7	0.057	1.24	0.00	0.00	0.00	0.10	0.12	0.00	0.00	1.11
					Upland Nonforested	5.029	0.0	50.5	0.016	0.33	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.30
					Wet Prairies	14.798	0.0	73.0	0.071	4.32	0.00	0.00	0.00	0.10	0.43	1.00	3.89	0.00
					Wetlands	1.683	0.0	77.0	0.092	0.64	0.00	0.00	0.00	0.10	0.06	1.00	0.58	0.00
	LYS 12-02h	None	None	4	Citrus Groves	1.138	0.0	43.0	0.009	0.04	0.00	0.00	0.00	0.65	0.03	0.00	0.00	0.01
					Nurseries	3.185	0.0	49.0	0.014	0.19	0.00	0.00	0.00	0.65	0.12	0.00	0.00	0.07
					Upland Mixed	0.501	0.0	76.6	0.089	0.19	0.00	0.00	0.00	0.65	0.12	0.00	0.00	0.06
	LYS 12-03b	None	None	0	Citrus Groves	7.439	0.0	43.0	0.009	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
					LDR	1.422	0.0	57.7	0.027	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
					Transportation	4.070	0.0	69.7	0.056	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95
					Upland Mixed	0.088	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	51.161	0.0	54.9	0.022	4.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.61
					Wet Prairies	24.803	0.0	73.0	0.071	7.24	0.00	0.00	0.00	0.00	0.00	1.00	7.24	0.00
					Wetlands	10.396	0.0	77.0	0.092	3.95	0.00	0.00	0.00	0.00	0.00	1.00	3.95	0.00
	LYS 12-03c	None	None	2	Citrus Groves	11.179	0.0	43.0	0.009	0.42	0.00	0.00	0.00	0.25	0.10	0.00	0.00	0.31
					LDR	6.861	0.0	51.5	0.017	0.49	0.00	0.00	0.00	0.25	0.12	0.00	0.00	0.37
					Nurseries	1.962	0.0	49.0	0.014	0.12	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.09
					Upland Mixed	6.941	0.0	59.7	0.030	0.86	0.00	0.00	0.00	0.25	0.21	0.00	0.00	0.64
					Upland Nonforested	6.682	0.0	54.9	0.022	0.60	0.00	0.00	0.00	0.25	0.15	0.00	0.00	0.45
					Wet Prairies	15.995	0.0	73.0	0.071	4.67	0.00	0.00	0.00	0.25	1.17	1.00	3.50	0.00
					Wetlands	4.102	0.0	77.0	0.092	1.56	0.00	0.00	0.00	0.25	0.39	1.00	1.17	0.00
	LYS 12-03d	None	None	5	Citrus Groves	11.058	0.0	43.5	0.009	0.43	0.00	0.00	0.00	0.80	0.34	0.00	0.00	0.09
					Nurseries	2.238	0.0	51.3	0.017	0.16	0.00	0.00	0.00	0.80	0.13	0.00	0.00	0.03
					Wet Prairies	5.004	0.0	73.0	0.071	1.46	0.00	0.00	0.00	0.80	1.17	1.00	0.29	0.00
	LYS 13-01	None	None	1	Citrus Groves	6.282	0.0	43.0	0.009	0.23	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.21
					LDR	4.672	0.0	46.2	0.012	0.22	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.20
					Pasture	8.438	0.0	52.3	0.018	0.64	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.58
					Recreational	5.452	0.0	39.6	0.007	0.15	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.13
					Upland Nonforested	3.529	0.0	59.1	0.029	0.42	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.38
					Wet Prairies	9.248	0.0	73.0	0.071	2.70	0.00	0.00	0.00	0.10	0.27	1.00	2.43	0.00
					Wetlands	1.462	0.0	77.0	0.092	0.56	0.00	0.00	0.00	0.10	0.06	1.00	0.50	0.00
	LYS 14-01	None	None	3	Pasture	0.792	0.0	49.0	0.014	0.05	0.00	0.00	0.00	0.50	0.02	0.00	0.00	0.02
					Recreational	1.669	0.0	39.0	0.006	0.04	0.00	0.00	0.00	0.50	0.02	0.00	0.00	0.02
					Upland Hardwood	0.461	0.0	77.0	0.092	0.18	0.00	0.00	0.00	0.50	0.09	0.00	0.00	0.09
					Wetlands	3.454	0.0	77.0	0.092	1.31	0.00	0.00	0.00	0.50	0.66	1.00	0.66	0.00
	LYS 14-02a	None	None	3	Citrus Groves	0.352	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.50	0.01	0.00	0.00	0.01

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYS-LYD	LYS 14-02a	None	None	3	Recreational	2.176	0.0	39.0	0.006	0.06	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
	LYS 15-01a	None	None	2	Pine Flatwoods	2.021	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
	LYS-LYD	None	None	0	Upland Nonforested	5.151	0.0	59.6	0.030	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
					Wetlands	19.755	0.0	77.0	0.092	7.51	0.00	0.00	0.00	0.00	0.00	1.00	7.51	0.00
LYW 01-01	LYW 01-01	None	None	1	Citrus Groves	33.031	0.0	57.1	0.026	3.49	0.00	0.00	0.00	0.10	0.35	0.00	0.00	3.14
					LDR	2.842	0.0	81.0	0.121	1.42	0.00	0.00	0.00	0.10	0.14	0.00	0.00	1.28
					Pasture	22.926	0.0	79.5	0.108	10.20	0.00	0.00	0.00	0.10	1.02	0.00	0.00	9.18
					Pine Flatwoods	5.117	0.0	77.0	0.092	1.95	0.00	0.00	0.00	0.10	0.19	0.00	0.00	1.75
					Row Crops	0.129	0.0	89.0	0.225	0.12	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.11
					Transportation	1.331	0.0	79.2	0.106	0.58	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.53
					Upland Hardwood	14.925	0.0	63.9	0.039	2.43	0.00	0.00	0.00	0.10	0.24	0.00	0.00	2.19
					Upland Mixed	128.325	0.0	75.3	0.081	43.16	0.00	0.00	0.00	0.10	4.32	0.00	0.00	38.84
					Wet Prairies	507.714	0.0	73.0	0.071	148.20	0.00	0.00	0.00	0.10	14.82	1.00	133.38	0.00
					Wetlands	4.442	0.0	77.0	0.092	1.69	0.00	0.00	0.00	0.10	0.17	1.00	1.52	0.00
		Wet Pond	None	1	Industrial	0.567	25.8	73.9	0.264	0.62	0.20	0.00	0.12	0.10	0.05	0.00	0.00	0.45
	LYW 01-02a	None	None	1	Upland Hardwood	10.922	0.0	61.5	0.034	1.53	0.00	0.00	0.00	0.10	0.15	0.00	0.00	1.38
					Wet Prairies	4.447	0.0	73.0	0.071	1.30	0.00	0.00	0.00	0.10	0.13	1.00	1.17	0.00
	LYW 01-02b	None	None	1	Citrus Groves	6.428	0.0	44.4	0.010	0.27	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.24
					Upland Hardwood	2.558	0.0	65.0	0.042	0.44	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.40
					Upland Mixed	1.242	0.0	47.8	0.013	0.07	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.06
					Wet Prairies	5.361	0.0	73.0	0.071	1.56	0.00	0.00	0.00	0.10	0.16	1.00	1.41	0.00
	LYW 01-02c	None	None	2	Citrus Groves	8.783	0.0	43.0	0.009	0.33	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.24
					LDR	0.101	0.0	80.9	0.120	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					Pasture	11.296	0.0	56.0	0.024	1.10	0.00	0.00	0.00	0.25	0.28	0.00	0.00	0.83
					Upland Mixed	7.100	0.0	69.4	0.056	1.63	0.00	0.00	0.00	0.25	0.41	0.00	0.00	1.22
					Wet Prairies	10.916	0.0	73.0	0.071	3.19	0.00	0.00	0.00	0.25	0.80	1.00	2.39	0.00
	LYW 01-02d	None	None	2	Pasture	5.758	0.0	63.4	0.038	0.91	0.00	0.00	0.00	0.25	0.23	0.00	0.00	0.68
					Pine Flatwoods	0.008	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Transportation	0.940	0.0	75.7	0.084	0.33	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.24
					Upland Mixed	7.959	0.0	76.3	0.088	2.89	0.00	0.00	0.00	0.25	0.72	0.00	0.00	2.16
					Wetlands	4.426	0.0	77.0	0.092	1.68	0.00	0.00	0.00	0.25	0.42	1.00	1.26	0.00
	LYW 01-02e	None	None	4	Citrus Groves	0.078	0.0	65.0	0.042	0.01	0.00	0.00	0.00	0.65	0.01	0.00	0.00	0.00
					LDR	1.630	0.0	81.8	0.128	0.87	0.00	0.00	0.00	0.65	0.56	0.00	0.00	0.30
					Row Crops	5.655	0.0	89.0	0.225	5.28	0.00	0.00	0.00	0.65	3.43	0.00	0.00	1.85
					Upland Mixed	0.972	0.0	77.0	0.092	0.37	0.00	0.00	0.00	0.65	0.24	0.00	0.00	0.13
		Wet Pond	None	4	Industrial	2.006	30.5	77.2	0.311	2.59	0.20	0.00	0.52	0.65	1.34	0.00	0.00	0.72
	LYW 01-02f	None	None	1	Citrus Groves	2.983	0.0	65.0	0.042	0.52	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.47
					LDR	0.561	0.0	81.8	0.128	0.30	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.27
					MDR	6.347	0.0	67.3	0.049	1.29	0.00	0.00	0.00	0.10	0.13	0.00	0.00	1.16
					Pine Flatwoods	4.376	0.0	77.0	0.092	1.66	0.00	0.00	0.00	0.10	0.17	0.00	0.00	1.50
					Row Crops	1.564	0.0	89.0	0.225	1.46	0.00	0.00	0.00	0.10	0.15	0.00	0.00	1.31
					Upland Mixed	0.511	0.0	77.0	0.092	0.19	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.17
					Wet Prairies	6.459	0.0	73.0	0.071	1.89	0.00	0.00	0.00	0.10	0.19	1.00	1.70	0.00
	LYW 01-02h	None	None	1	Pasture	0.001	0.0	84.0	0.150	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Upland Mixed	18.381	0.0	77.0	0.092	6.99	0.00	0.00	0.00	0.10	0.70	0.00	0.00	6.29
					Wet Prairies	4.708	0.0	73.0	0.071	1.37	0.00	0.00	0.00	0.10	0.14	1.00	1.24	0.00
					Wetlands	7.419	0.0	77.0	0.092	2.82	0.00	0.00	0.00	0.10	0.28	1.00	2.54	0.00
	LYW 01-02i	None	None	2	Upland Mixed	4.694	0.0	77.0	0.092	1.78	0.00	0.00	0.00	0.25	0.45	0.00	0.00	1.34
					Wet Prairies	1.345	0.0	73.0	0.071	0.39	0.00	0.00	0.00	0.25	0.10	1.00	0.29	0.00
	LYW 01-02j	None	None	2	Pasture	7.321	0.0	84.0	0.150	4.54	0.00	0.00	0.00	0.25	1.14	0.00	0.00	3.41
					Upland Mixed	5.102	0.0	77.0	0.092	1.94	0.00	0.00	0.00	0.25	0.49	0.00	0.00	1.46
					Wet Prairies	1.713	0.0	73.0	0.071	0.50	0.00	0.00	0.00	0.25	0.12	1.00	0.37	0.00
	LYW 01-02k	None	None	1	Citrus Groves	5.301	0.0	44.3	0.010	0.22	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.20
	LYW 01-03a	None	None	3	Citrus Groves	9.989	0.0	57.3	0.026	1.06	0.00	0.00	0.00	0.50	0.53	0.00	0.00	0.53
					LDR	2.275	0.0	48.5	0.014	0.13	0.00	0.00	0.00	0.50	0.07	0.00	0.00	0.07
					Upland Mixed	4.298	0.0	56.9	0.025	0.45	0.00	0.00	0.00	0.50	0.22	0.00	0.00	0.22
					Upland Nonforested	5.538	0.0	59.8	0.030	0.69	0.00	0.00	0.00	0.50	0.34	0.00	0.00	0.34

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYW 01-01	LYW 01-03a	None	None	3	Wet Prairies	4.386	0.0	73.0	0.071	1.28	0.00	0.00	0.00	0.50	0.64	1.00	0.64	0.00
					Wetlands	1.411	0.0	77.0	0.092	0.54	0.00	0.00	0.00	0.50	0.27	1.00	0.27	0.00
	LYW 01-03b	None	None	3	Citrus Groves	3.173	0.0	43.1	0.009	0.12	0.00	0.00	0.00	0.50	0.06	0.00	0.00	0.06
					Pasture	0.650	0.0	53.6	0.020	0.05	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					Upland Mixed	3.513	0.0	64.9	0.042	0.61	0.00	0.00	0.00	0.50	0.30	0.00	0.00	0.30
					Wet Prairies	1.591	0.0	73.0	0.071	0.46	0.00	0.00	0.00	0.50	0.23	1.00	0.23	0.00
	LYW 01-04a	None	None	2	Citrus Groves	1.478	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					LDR	0.774	0.0	48.5	0.014	0.04	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.03
					Upland Nonforested	5.220	0.0	51.0	0.017	0.36	0.00	0.00	0.00	0.25	0.09	0.00	0.00	0.27
					Wet Prairies	3.167	0.0	73.0	0.071	0.92	0.00	0.00	0.00	0.25	0.23	1.00	0.69	0.00
	LYW 01-04b	None	None	2	Citrus Groves	3.127	0.0	43.0	0.009	0.12	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.09
					LDR	4.822	0.0	45.8	0.011	0.22	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.17
					Pine Flatwoods	0.826	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Transportation	1.265	0.0	67.2	0.049	0.26	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.19
					Upland Mixed	1.852	0.0	30.0	0.002	0.02	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Upland Nonforested	0.314	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
	LYW 01-04c	None	None	3	Pasture	1.072	0.0	49.0	0.014	0.06	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					Transportation	0.333	0.0	69.7	0.056	0.08	0.00	0.00	0.00	0.50	0.04	0.00	0.00	0.04
					Upland Mixed	2.461	0.0	44.6	0.010	0.10	0.00	0.00	0.00	0.50	0.05	0.00	0.00	0.05
	LYW 01-05a	None	None	1	Pine Flatwoods	1.370	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Upland Nonforested	1.772	0.0	43.0	0.009	0.07	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.06
	LYW 02-01	None	None	2	LDR	9.202	0.0	79.9	0.110	4.20	0.00	0.00	0.00	0.25	1.05	0.00	0.00	3.15
					Nurseries	5.260	0.0	76.0	0.086	1.86	0.00	0.00	0.00	0.25	0.47	0.00	0.00	1.40
					Pasture	3.093	0.0	84.0	0.150	1.92	0.00	0.00	0.00	0.25	0.48	0.00	0.00	1.44
					Pine Flatwoods	2.024	0.0	72.6	0.069	0.58	0.00	0.00	0.00	0.25	0.14	0.00	0.00	0.43
					Shrub and Brushland	0.897	0.0	73.0	0.071	0.26	0.00	0.00	0.00	0.25	0.07	0.00	0.00	0.20
					Transportation	2.341	0.0	78.3	0.100	0.97	0.00	0.00	0.00	0.25	0.24	0.00	0.00	0.73
					Upland Mixed	2.413	0.0	77.0	0.092	0.92	0.00	0.00	0.00	0.25	0.23	0.00	0.00	0.69
					Upland Nonforested	13.433	0.0	80.0	0.111	6.16	0.00	0.00	0.00	0.25	1.54	0.00	0.00	4.62
					Wetlands	28.194	0.0	77.0	0.092	10.72	0.00	0.00	0.00	0.25	2.68	1.00	8.04	0.00
	LYW 02-02a	None	None	3	Citrus Groves	1.852	0.0	43.0	0.009	0.07	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					LDR	1.032	0.0	80.9	0.120	0.51	0.00	0.00	0.00	0.50	0.26	0.00	0.00	0.26
					Pasture	3.084	0.0	49.0	0.014	0.18	0.00	0.00	0.00	0.50	0.09	0.00	0.00	0.09
					Pine Flatwoods	13.286	0.0	31.0	0.003	0.15	0.00	0.00	0.00	0.50	0.07	0.00	0.00	0.07
					Transportation	0.327	0.0	69.7	0.056	0.08	0.00	0.00	0.00	0.50	0.04	0.00	0.00	0.04
					Upland Hardwood	0.570	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
					Upland Mixed	10.273	0.0	73.7	0.074	3.13	0.00	0.00	0.00	0.50	1.57	0.00	0.00	1.57
					Upland Nonforested	8.020	0.0	50.0	0.015	0.51	0.00	0.00	0.00	0.50	0.25	0.00	0.00	0.25
					Wetlands	14.701	0.0	77.0	0.092	5.59	0.00	0.00	0.00	0.50	2.80	1.00	2.80	0.00
	LYW 02-02b	None	None	2	LDR	3.279	0.0	80.9	0.120	1.62	0.00	0.00	0.00	0.25	0.41	0.00	0.00	1.22
					Shrub and Brushland	0.196	0.0	73.0	0.071	0.06	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
	LYW 02-02c	None	None	1	Citrus Groves	7.664	0.0	59.3	0.029	0.93	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.84
					LDR	8.419	0.0	75.7	0.084	2.91	0.00	0.00	0.00	0.10	0.29	0.00	0.00	2.62
					Nurseries	2.147	0.0	84.0	0.150	1.33	0.00	0.00	0.00	0.10	0.13	0.00	0.00	1.20
					Pasture	4.788	0.0	71.1	0.062	1.23	0.00	0.00	0.00	0.10	0.12	0.00	0.00	1.11
					Pine Flatwoods	3.450	0.0	69.0	0.054	0.78	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.70
					Shrub and Brushland	3.563	0.0	73.0	0.071	1.04	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.94
					Upland Mixed	44.087	0.0	65.6	0.044	8.01	0.00	0.00	0.00	0.10	0.80	0.00	0.00	7.20
					Wetlands	57.325	0.0	77.0	0.092	21.80	0.00	0.00	0.00	0.10	2.18	1.00	19.62	0.00
	LYW 02-02d	None	None	2	Citrus Groves	9.684	0.0	44.2	0.010	0.39	0.00	0.00	0.00	0.25	0.10	0.00	0.00	0.30
					LDR	7.979	0.0	72.9	0.070	2.32	0.00	0.00	0.00	0.25	0.58	0.00	0.00	1.74
					Nurseries	8.713	0.0	77.9	0.098	3.52	0.00	0.00	0.00	0.25	0.88	0.00	0.00	2.64
					Pasture	1.815	0.0	49.0	0.014	0.11	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.08
					Pine Flatwoods	3.689	0.0	66.9	0.048	0.73	0.00	0.00	0.00	0.25	0.18	0.00	0.00	0.55
					Transportation	1.169	0.0	62.6	0.036	0.18	0.00	0.00	0.00	0.25	0.04	0.00	0.00	0.13
					Upland Mixed	11.378	0.0	63.4	0.038	1.80	0.00	0.00	0.00	0.25	0.45	0.00	0.00	1.35
					Upland Nonforested	3.802	0.0	81.9	0.129	2.03	0.00	0.00	0.00	0.25	0.51	0.00	0.00	1.52

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYW 01-01	LYW 02-02d	None	None	2	Wetlands	2.982	0.0	77.0	0.092	1.13	0.00	0.00	0.00	0.25	0.28	1.00	0.85	0.00
	LYW 02-03a	None	None	2	Citrus Groves	1.006	0.0	43.0	0.009	0.04	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.03
					Pasture	11.778	0.0	49.6	0.015	0.73	0.00	0.00	0.00	0.25	0.18	0.00	0.00	0.55
					Pine Flatwoods	0.001	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Shrub and Brushland	7.037	0.0	41.0	0.008	0.22	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.16
					Upland Hardwood	3.490	0.0	30.0	0.002	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.03
					Upland Mixed	13.011	0.0	70.9	0.062	3.31	0.00	0.00	0.00	0.25	0.83	0.00	0.00	2.49
					Wetlands	5.690	0.0	77.0	0.092	2.16	0.00	0.00	0.00	0.25	0.54	1.00	1.62	0.00
	LYW 02-03b	None	None	1	Citrus Groves	0.672	0.0	43.0	0.009	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.02
					Pasture	1.842	0.0	72.4	0.068	0.52	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.47
					Upland Mixed	14.397	0.0	76.0	0.086	5.10	0.00	0.00	0.00	0.10	0.51	0.00	0.00	4.59
	LYW 02-03c	None	None	3	Citrus Groves	9.376	0.0	59.4	0.029	1.14	0.00	0.00	0.00	0.50	0.57	0.00	0.00	0.57
					LDR	4.743	0.0	74.9	0.079	1.54	0.00	0.00	0.00	0.50	0.77	0.00	0.00	0.77
					Pasture	0.163	0.0	74.8	0.079	0.05	0.00	0.00	0.00	0.50	0.03	0.00	0.00	0.03
					Pine Flatwoods	1.956	0.0	73.6	0.073	0.59	0.00	0.00	0.00	0.50	0.30	0.00	0.00	0.30
					Upland Mixed	3.021	0.0	58.1	0.027	0.34	0.00	0.00	0.00	0.50	0.17	0.00	0.00	0.17
					Wetlands	6.864	0.0	77.0	0.092	2.61	0.00	0.00	0.00	0.50	1.31	1.00	1.31	0.00
	LYW 02-03d	None	None	6	Citrus Groves	1.379	0.0	65.0	0.042	0.24	0.00	0.00	0.00	0.90	0.22	0.00	0.00	0.02
					LDR	10.181	0.0	80.4	0.115	4.84	0.00	0.00	0.00	0.90	4.36	0.00	0.00	0.48
					MDR	8.092	0.0	62.3	0.036	1.20	0.00	0.00	0.00	0.90	1.08	0.00	0.00	0.12
					Pasture	6.413	0.0	70.8	0.061	1.62	0.00	0.00	0.00	0.90	1.46	0.00	0.00	0.16
					Pine Flatwoods	3.757	0.0	64.5	0.041	0.64	0.00	0.00	0.00	0.90	0.57	0.00	0.00	0.06
					Transportation	1.420	0.0	71.6	0.064	0.38	0.00	0.00	0.00	0.90	0.34	0.00	0.00	0.04
					Upland Mixed	4.035	0.0	73.3	0.072	1.20	0.00	0.00	0.00	0.90	1.08	0.00	0.00	0.12
					Upland Nonforested	7.881	0.0	73.0	0.070	2.30	0.00	0.00	0.00	0.90	2.07	0.00	0.00	0.23
	LYW 02-03e	None	None	1	Citrus Groves	5.126	0.0	47.1	0.013	0.27	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.24
					LDR	1.451	0.0	81.8	0.128	0.77	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.69
					MDR	0.196	0.0	53.8	0.020	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01
					Transportation	0.957	0.0	69.7	0.056	0.22	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.20
					Upland Nonforested	0.054	0.0	82.0	0.130	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03
					Wetlands	2.865	0.0	77.0	0.092	1.09	0.00	0.00	0.00	0.10	0.11	1.00	0.98	0.00
	LYW 02-04a	None	None	1	Citrus Groves	0.741	0.0	47.4	0.013	0.04	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.04
					LDR	0.373	0.0	48.7	0.014	0.02	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.02
					Pasture	0.004	0.0	49.0	0.014	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
					Upland Mixed	2.275	0.0	62.3	0.036	0.34	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.30
	LYW 02-04b	None	None	2	Citrus Groves	1.046	0.0	47.7	0.013	0.06	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					Pasture	2.655	0.0	74.7	0.078	0.86	0.00	0.00	0.00	0.25	0.21	0.00	0.00	0.64
					Upland Mixed	3.710	0.0	69.9	0.057	0.88	0.00	0.00	0.00	0.25	0.22	0.00	0.00	0.66
					Upland Nonforested	0.501	0.0	68.4	0.053	0.11	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.08
					Wetlands	6.761	0.0	77.0	0.092	2.57	0.00	0.00	0.00	0.25	0.64	1.00	1.93	0.00
	LYW 02-04c	None	None	4	Citrus Groves	4.540	0.0	49.1	0.014	0.27	0.00	0.00	0.00	0.65	0.18	0.00	0.00	0.09
					LDR	20.057	0.0	73.3	0.072	5.98	0.00	0.00	0.00	0.65	3.89	0.00	0.00	2.09
					MDR	18.706	0.0	60.2	0.031	2.39	0.00	0.00	0.00	0.65	1.55	0.00	0.00	0.84
					Pasture	2.319	0.0	58.4	0.028	0.27	0.00	0.00	0.00	0.65	0.17	0.00	0.00	0.09
					Transportation	2.208	0.0	69.3	0.055	0.51	0.00	0.00	0.00	0.65	0.33	0.00	0.00	0.18
					Upland Mixed	1.958	0.0	59.2	0.029	0.24	0.00	0.00	0.00	0.65	0.15	0.00	0.00	0.08
					Upland Nonforested	2.527	0.0	64.8	0.041	0.43	0.00	0.00	0.00	0.65	0.28	0.00	0.00	0.15
	LYW 02-04d	None	None	2	Citrus Groves	12.259	0.0	43.7	0.009	0.48	0.00	0.00	0.00	0.25	0.12	0.00	0.00	0.36
					Commercial	0.801	0.0	53.2	0.020	0.06	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.05
					LDR	6.737	0.0	64.9	0.042	1.16	0.00	0.00	0.00	0.25	0.29	0.00	0.00	0.87
					MDR	0.855	0.0	56.2	0.024	0.08	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.06
					Pasture	1.584	0.0	57.5	0.026	0.17	0.00	0.00	0.00	0.25	0.04	0.00	0.00	0.13
					Pine Flatwoods	3.205	0.0	30.0	0.002	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					Transportation	2.675	0.0	67.1	0.049	0.54	0.00	0.00	0.00	0.25	0.13	0.00	0.00	0.40
					Upland Mixed	0.355	0.0	77.0	0.092	0.14	0.00	0.00	0.00	0.25	0.03	0.00	0.00	0.10
					Upland Nonforested	0.152	0.0	46.8	0.012	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
	LYW 02-05a	None	None	1	Citrus Groves	0.197	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYW 01-01	LYW 02-05a	None	None	1	Pasture	14.548	0.0	72.0	0.066	3.98	0.00	0.00	0.00	0.10	0.40	0.00	0.00	3.59
					Transportation	0.370	0.0	55.5	0.023	0.03	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03
	LYW 02-05b	None	None	2	Citrus Groves	22.185	0.0	44.0	0.010	0.90	0.00	0.00	0.00	0.25	0.22	0.00	0.00	0.67
					LDR	4.330	0.0	67.8	0.051	0.91	0.00	0.00	0.00	0.25	0.23	0.00	0.00	0.68
					MDR	11.993	0.0	68.3	0.052	2.59	0.00	0.00	0.00	0.25	0.65	0.00	0.00	1.95
					Pasture	16.273	0.0	71.6	0.065	4.35	0.00	0.00	0.00	0.25	1.09	0.00	0.00	3.26
					Pine Flatwoods	0.394	0.0	30.0	0.002	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Transportation	2.511	0.0	55.4	0.023	0.23	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.18
					Upland Mixed	2.457	0.0	73.1	0.071	0.72	0.00	0.00	0.00	0.25	0.18	0.00	0.00	0.54
					Upland Nonforested	1.697	0.0	68.3	0.052	0.37	0.00	0.00	0.00	0.25	0.09	0.00	0.00	0.28
					Wet Prairies	4.072	0.0	73.0	0.071	1.19	0.00	0.00	0.00	0.25	0.30	1.00	0.89	0.00
					Wetlands	3.133	0.0	77.0	0.092	1.19	0.00	0.00	0.00	0.25	0.30	1.00	0.89	0.00
	LYW 02-05c	None	None	5	Citrus Groves	15.087	0.0	43.0	0.009	0.56	0.00	0.00	0.00	0.80	0.45	0.00	0.00	0.11
					Commercial	0.241	0.0	49.3	0.015	0.01	0.00	0.00	0.00	0.80	0.01	0.00	0.00	0.00
					LDR	2.424	0.0	48.5	0.014	0.14	0.00	0.00	0.00	0.80	0.11	0.00	0.00	0.03
					MDR	1.124	0.0	53.7	0.020	0.09	0.00	0.00	0.00	0.80	0.08	0.00	0.00	0.02
					Pasture	0.414	0.0	49.0	0.014	0.02	0.00	0.00	0.00	0.80	0.02	0.00	0.00	0.00
					Upland Mixed	0.236	0.0	67.6	0.050	0.05	0.00	0.00	0.00	0.80	0.04	0.00	0.00	0.01
					Wet Prairies	0.238	0.0	73.0	0.071	0.07	0.00	0.00	0.00	0.80	0.06	1.00	0.01	0.00
	LYW 02-06a	None	None	5	Citrus Groves	10.426	0.0	49.9	0.015	0.66	0.00	0.00	0.00	0.80	0.53	0.00	0.00	0.13
					Pasture	22.628	0.0	65.1	0.042	3.95	0.00	0.00	0.00	0.80	3.16	0.00	0.00	0.79
					Transportation	2.831	0.0	59.2	0.029	0.34	0.00	0.00	0.00	0.80	0.27	0.00	0.00	0.07
					Upland Mixed	0.586	0.0	30.0	0.002	0.01	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
					Wet Prairies	3.971	0.0	73.0	0.071	1.16	0.00	0.00	0.00	0.80	0.93	1.00	0.23	0.00
	LYW 02-06c	None	None	5	Citrus Groves	0.103	0.0	43.0	0.009	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
					LDR	1.266	0.0	68.9	0.054	0.28	0.00	0.00	0.00	0.80	0.23	0.00	0.00	0.06
					Pasture	5.649	0.0	70.4	0.059	1.38	0.00	0.00	0.00	0.80	1.10	0.00	0.00	0.28
					Transportation	0.572	0.0	60.2	0.031	0.07	0.00	0.00	0.00	0.80	0.06	0.00	0.00	0.01
	LYW 02-06d	None	None	1	Citrus Groves	13.981	0.0	44.4	0.010	0.58	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.52
					Institutional	1.506	14.2	40.1	0.121	0.76	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.68
					LDR	49.333	0.0	74.7	0.078	15.94	0.00	0.00	0.00	0.10	1.59	0.00	0.00	14.34
					MDR	1.879	0.0	52.2	0.018	0.14	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.13
					Pasture	16.115	0.0	78.7	0.103	6.84	0.00	0.00	0.00	0.10	0.68	0.00	0.00	6.16
					Pine Flatwoods	3.786	0.0	54.0	0.021	0.32	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.29
					Transportation	3.521	0.0	63.5	0.039	0.56	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.51
					Upland Mixed	24.799	0.0	51.8	0.018	1.82	0.00	0.00	0.00	0.10	0.18	0.00	0.00	1.64
					Upland Nonforested	8.581	0.0	74.7	0.078	2.77	0.00	0.00	0.00	0.10	0.28	0.00	0.00	2.49
					Wetlands	2.652	0.0	77.0	0.092	1.01	0.00	0.00	0.00	0.10	0.10	1.00	0.91	0.00
	LYW 02-07c	None	None	5	Citrus Groves	45.685	0.0	43.0	0.009	1.70	0.00	0.00	0.00	0.80	1.36	0.00	0.00	0.34
					LDR	10.263	0.0	48.5	0.014	0.59	0.00	0.00	0.00	0.80	0.47	0.00	0.00	0.12
					MDR	1.980	0.0	57.9	0.027	0.22	0.00	0.00	0.00	0.80	0.18	0.00	0.00	0.04
					Pasture	84.889	0.0	52.6	0.019	6.57	0.00	0.00	0.00	0.80	5.25	0.00	0.00	1.31
					Pine Flatwoods	3.090	0.0	30.0	0.002	0.03	0.00	0.00	0.00	0.80	0.02	0.00	0.00	0.01
					Transportation	2.832	0.0	59.1	0.029	0.34	0.00	0.00	0.00	0.80	0.27	0.00	0.00	0.07
					Upland Mixed	6.358	0.0	49.3	0.015	0.39	0.00	0.00	0.00	0.80	0.31	0.00	0.00	0.08
					Upland Nonforested	0.200	0.0	43.0	0.009	0.01	0.00	0.00	0.00	0.80	0.01	0.00	0.00	0.00
					Wet Prairies	0.141	0.0	73.0	0.071	0.04	0.00	0.00	0.00	0.80	0.03	1.00	0.01	0.00
	LYW 02-07f	Dry Pond	None	0	Institutional	2.916	51.2	45.9	0.420	5.07	0.80	0.00	4.06	0.00	0.00	0.00	0.00	1.01
		None	None	0	Citrus Groves	0.180	0.0	56.3	0.024	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
					MDR	0.881	0.0	53.8	0.020	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
					Upland Mixed	0.045	0.0	77.0	0.092	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
		Wet Pond	None	0	Institutional	10.053	41.1	48.9	0.341	14.18	0.20	0.00	2.84	0.00	0.00	0.00	0.00	11.35
	LYW 03-01	Dry Pond	None	1	Industrial	14.501	70.0	98.0	0.745	44.71	0.80	0.00	35.77	0.10	0.89	0.00	0.00	8.05
		None	None	1	Citrus Groves	15.137	0.0	54.6	0.021	1.34	0.00	0.00	0.00	0.10	0.13	0.00	0.00	1.20
					Industrial	24.081	5.0	64.1	0.079	7.83	0.00	0.00	0.00	0.10	0.78	0.00	0.00	7.05
					LDR	3.678	0.0	45.7	0.011	0.17	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.15
					MDR	4.307	0.0	66.0	0.045	0.80	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.72

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYW 01-01	LYW 03-01	None	None	1	Mobile Homes	26.460	1.8	67.9	0.065	7.13	0.00	0.00	0.00	0.10	0.71	0.00	0.00	6.42
					Nurseries	4.088	0.0	82.0	0.130	2.20	0.00	0.00	0.00	0.10	0.22	0.00	0.00	1.98
					Pasture	34.020	0.0	78.5	0.102	14.29	0.00	0.00	0.00	0.10	1.43	0.00	0.00	12.86
					Pine Flatwoods	287.562	0.0	76.5	0.088	105.28	0.00	0.00	0.00	0.10	10.53	0.00	0.00	94.75
					Shrub and Brushland	26.941	0.0	72.4	0.068	7.59	0.00	0.00	0.00	0.10	0.76	0.00	0.00	6.83
					Transportation	0.874	0.0	65.6	0.044	0.16	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.14
					Upland Hardwood	19.528	0.0	72.1	0.067	5.39	0.00	0.00	0.00	0.10	0.54	0.00	0.00	4.85
					Upland Mixed	123.858	0.0	71.9	0.066	33.62	0.00	0.00	0.00	0.10	3.36	0.00	0.00	30.26
					Upland Nonforested	64.519	0.0	72.2	0.067	17.91	0.00	0.00	0.00	0.10	1.79	0.00	0.00	16.12
					Utilities	14.906	0.0	79.5	0.108	6.66	0.00	0.00	0.00	0.10	0.67	0.00	0.00	6.00
					Wet Prairies	114.526	0.0	73.0	0.071	33.43	0.00	0.00	0.00	0.10	3.34	1.00	30.09	0.00
					Wetlands	458.298	0.0	77.0	0.092	174.27	0.00	0.00	0.00	0.10	17.43	1.00	156.84	0.00
		Swale	None	1	Transportation	1.594	0.0	73.9	0.075	0.49	0.20	0.00	0.10	0.10	0.04	0.00	0.00	0.35
		Wet Pond	None	1	Industrial	16.348	70.0	98.0	0.745	50.41	0.20	0.00	10.08	0.10	4.03	0.00	0.00	36.29
					Mobile Homes	8.874	0.0	68.0	0.051	1.89	0.20	0.00	0.38	0.10	0.15	0.00	0.00	1.36
	LYW 03-02a	None	None	3	MDR	3.982	0.0	64.4	0.041	0.67	0.00	0.00	0.00	0.50	0.34	0.00	0.00	0.34
					Pasture	1.203	0.0	56.0	0.024	0.12	0.00	0.00	0.00	0.50	0.06	0.00	0.00	0.06
					Upland Mixed	1.398	0.0	77.0	0.092	0.53	0.00	0.00	0.00	0.50	0.27	0.00	0.00	0.27
	LYW 03-02b	None	None	1	Citrus Groves	2.017	0.0	72.6	0.069	0.58	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.52
					MDR	0.612	0.0	50.8	0.016	0.04	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.04
					Pasture	3.605	0.0	63.3	0.038	0.57	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.51
					Pine Flatwoods	6.011	0.0	77.0	0.092	2.29	0.00	0.00	0.00	0.10	0.23	0.00	0.00	2.06
					Upland Mixed	4.269	0.0	77.0	0.092	1.62	0.00	0.00	0.00	0.10	0.16	0.00	0.00	1.46
					Upland Nonforested	3.182	0.0	43.4	0.009	0.12	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.11
					Wet Prairies	6.155	0.0	73.0	0.071	1.80	0.00	0.00	0.00	0.10	0.18	1.00	1.62	0.00
					Wetlands	5.651	0.0	77.0	0.092	2.15	0.00	0.00	0.00	0.10	0.21	1.00	1.93	0.00
	LYW 03-02c	None	None	1	LDR	1.157	0.0	48.5	0.014	0.07	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.06
					Pine Flatwoods	2.240	0.0	76.4	0.088	0.82	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.74
					Upland Mixed	7.591	0.0	31.8	0.003	0.09	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.08
					Upland Nonforested	1.401	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.10	0.01	0.00	0.00	0.05
					Wetlands	5.329	0.0	77.0	0.092	2.03	0.00	0.00	0.00	0.10	0.20	1.00	1.82	0.00
	LYW 03-02d	None	None	8	Citrus Groves	13.750	0.0	43.0	0.009	0.51	0.00	0.00	0.00	1.00	0.51	0.00	0.00	0.00
					LDR	6.124	0.0	61.6	0.034	0.87	0.00	0.00	0.00	1.00	0.87	0.00	0.00	0.00
					MDR	0.208	0.0	50.8	0.016	0.01	0.00	0.00	0.00	1.00	0.01	0.00	0.00	0.00
					Pasture	4.228	0.0	63.7	0.039	0.68	0.00	0.00	0.00	1.00	0.68	0.00	0.00	0.00
					Recreational	2.308	0.0	43.3	0.009	0.09	0.00	0.00	0.00	1.00	0.09	0.00	0.00	0.00
					Transportation	3.998	0.0	65.6	0.044	0.72	0.00	0.00	0.00	1.00	0.72	0.00	0.00	0.00
					Upland Mixed	2.922	0.0	51.8	0.018	0.21	0.00	0.00	0.00	1.00	0.21	0.00	0.00	0.00
					Upland Nonforested	2.191	0.0	60.0	0.030	0.28	0.00	0.00	0.00	1.00	0.28	0.00	0.00	0.00
					Wet Prairies	3.380	0.0	73.0	0.071	0.99	0.00	0.00	0.00	1.00	0.99	1.00	0.00	0.00
	LYW 03-02e	None	None	2	Industrial	0.147	0.0	68.6	0.053	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					Pasture	3.688	0.0	84.0	0.150	2.29	0.00	0.00	0.00	0.25	0.57	0.00	0.00	1.72
					Pine Flatwoods	5.823	0.0	76.6	0.089	2.15	0.00	0.00	0.00	0.25	0.54	0.00	0.00	1.61
					Upland Mixed	4.517	0.0	66.5	0.047	0.87	0.00	0.00	0.00	0.25	0.22	0.00	0.00	0.66
					Wet Prairies	0.365	0.0	73.0	0.071	0.11	0.00	0.00	0.00	0.25	0.03	1.00	0.08	0.00
	LYW 03-02f	None	None	2	Pasture	3.718	0.0	54.5	0.021	0.33	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.25
					Pine Flatwoods	3.875	0.0	46.5	0.012	0.19	0.00	0.00	0.00	0.25	0.05	0.00	0.00	0.14
					Wet Prairies	1.403	0.0	73.0	0.071	0.41	0.00	0.00	0.00	0.25	0.10	1.00	0.31	0.00
					Wetlands	0.111	0.0	77.0	0.092	0.04	0.00	0.00	0.00	0.25	0.01	1.00	0.03	0.00
	LYW 03-02g	None	None	1	Pasture	3.054	0.0	84.0	0.150	1.90	0.00	0.00	0.00	0.10	0.19	0.00	0.00	1.71
					Upland Mixed	7.535	0.0	77.0	0.092	2.87	0.00	0.00	0.00	0.10	0.29	0.00	0.00	2.58
					Wet Prairies	2.094	0.0	73.0	0.071	0.61	0.00	0.00	0.00	0.10	0.06	1.00	0.55	0.00
					Wetlands	2.080	0.0	77.0	0.092	0.79	0.00	0.00	0.00	0.10	0.08	1.00	0.71	0.00
	LYW 03-02h	Dry Pond	None	4	LDR	3.811	0.0	81.8	0.128	2.03	0.80	0.00	1.62	0.65	0.26	0.00	0.00	0.14
					Pine Flatwoods	0.856	0.0	77.0	0.092	0.33	0.80	0.00	0.26	0.65	0.04	0.00	0.00	0.02
					Upland Mixed	0.958	0.0	77.0	0.092	0.36	0.80	0.00	0.29	0.65	0.05	0.00	0.00	0.03
		None	None	4	Citrus Groves	13.157	0.0	43.3	0.009	0.50	0.00	0.00	0.00	0.65	0.33	0.00	0.00	0.18

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYW 01-01	**LYW 03-02h**	None	**None**	4	**Commercial**	1.437	**25.9**	68.4	**0.248**	1.48	**0.00**	0.00	**0.00**	0.65	**0.96**	0.00	**0.00**	0.52
					LDR	12.875	**0.0**	81.5	**0.125**	6.67	**0.00**	0.00	**0.00**	0.65	**4.33**	0.00	**0.00**	2.33
					MDR	1.568	**0.0**	70.8	**0.061**	0.40	**0.00**	0.00	**0.00**	0.65	**0.26**	0.00	**0.00**	0.14
					Mobile Homes	6.815	**0.0**	67.6	**0.050**	1.41	**0.00**	0.00	**0.00**	0.65	**0.92**	0.00	**0.00**	0.50
					Nurseries	4.352	**0.0**	94.3	**0.383**	6.89	**0.00**	0.00	**0.00**	0.65	**4.48**	0.00	**0.00**	2.41
					Pasture	6.124	**0.0**	84.0	**0.150**	3.80	**0.00**	0.00	**0.00**	0.65	**2.47**	0.00	**0.00**	1.33
					Pine Flatwoods	21.434	**0.0**	77.0	**0.092**	8.15	**0.00**	0.00	**0.00**	0.65	**5.30**	0.00	**0.00**	2.85
					Row Crops	0.475	**0.0**	89.0	**0.225**	0.44	**0.00**	0.00	**0.00**	0.65	**0.29**	0.00	**0.00**	0.16
					Upland Mixed	0.723	**0.0**	77.0	**0.092**	0.27	**0.00**	0.00	**0.00**	0.65	**0.18**	0.00	**0.00**	0.10
					Upland Nonforested	15.050	**0.0**	82.0	**0.130**	8.12	**0.00**	0.00	**0.00**	0.65	**5.28**	0.00	**0.00**	2.84
					Wet Prairies	10.199	**0.0**	73.0	**0.071**	2.98	**0.00**	0.00	**0.00**	0.65	**1.94**	1.00	**1.04**	0.00
					Wetlands	5.990	**0.0**	77.0	**0.092**	2.28	**0.00**	0.00	**0.00**	0.65	**1.48**	1.00	**0.80**	0.00
		Swale	**None**	4	**Transportation**	17.976	**0.0**	74.0	**0.075**	5.56	**0.20**	0.00	**1.11**	0.65	**2.89**	0.00	**0.00**	1.56
		Wet Pond	**None**	4	**Commercial**	9.444	**2.1**	77.6	**0.111**	4.34	**0.20**	0.00	**0.87**	0.65	**2.26**	0.00	**0.00**	1.21
					Industrial	6.013	**63.1**	87.8	**0.586**	14.59	**0.20**	0.00	**2.92**	0.65	**7.59**	0.00	**0.00**	4.09
					Institutional	1.407	**0.0**	75.5	**0.083**	0.48	**0.20**	0.00	**0.10**	0.65	**0.25**	0.00	**0.00**	0.13
					LDR	1.983	**0.0**	82.7	**0.137**	1.12	**0.20**	0.00	**0.22**	0.65	**0.58**	0.00	**0.00**	0.31
					MDR	0.119	**0.0**	74.4	**0.077**	0.04	**0.20**	0.00	**0.01**	0.65	**0.02**	0.00	**0.00**	0.01
					Mobile Homes	2.668	**0.0**	67.6	**0.050**	0.55	**0.20**	0.00	**0.11**	0.65	**0.29**	0.00	**0.00**	0.15
					Pine Flatwoods	0.414	**0.0**	77.0	**0.092**	0.16	**0.20**	0.00	**0.03**	0.65	**0.08**	0.00	**0.00**	0.04
					Transportation	0.029	**0.0**	79.5	**0.108**	0.01	**0.20**	0.00	**0.00**	0.65	**0.01**	0.00	**0.00**	0.00
					Upland Mixed	4.384	**0.0**	77.0	**0.092**	1.67	**0.20**	0.00	**0.33**	0.65	**0.87**	0.00	**0.00**	0.47
					Upland Nonforested	19.696	**0.0**	80.5	**0.116**	9.43	**0.20**	0.00	**1.89**	0.65	**4.90**	0.00	**0.00**	2.64
					Utilities	1.510	**0.0**	90.9	**0.271**	1.70	**0.20**	0.00	**0.34**	0.65	**0.88**	0.00	**0.00**	0.47
	LYW 03-02i	None	**None**	3	**Infiltration Pond**	7.900	**0.0**	0.0	**0.000**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.006	**0.0**	43.0	**0.009**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					Utilities	3.157	**0.0**	65.0	**0.042**	0.55	**0.00**	0.00	**0.00**	0.50	**0.27**	0.00	**0.00**	0.27
	LYW 03-02j	None	**None**	5	**Infiltration Pond**	8.992	**0.0**	0.0	**0.000**	0.00	**0.00**	0.00	**0.00**	0.80	**0.00**	0.00	**0.00**	0.00
					Utilities	2.778	**0.0**	82.0	**0.130**	1.50	**0.00**	0.00	**0.00**	0.80	**1.20**	0.00	**0.00**	0.30
	LYW 03-02k	None	**None**	5	**Commercial**	4.531	**7.4**	61.8	**0.092**	1.72	**0.00**	0.00	**0.00**	0.80	**1.38**	0.00	**0.00**	0.34
					Industrial	8.229	**70.0**	98.0	**0.745**	25.37	**0.00**	0.00	**0.00**	0.80	**20.30**	0.00	**0.00**	5.07
					LDR	2.640	**0.0**	56.0	**0.024**	0.26	**0.00**	0.00	**0.00**	0.80	**0.21**	0.00	**0.00**	0.05
					MDR	23.382	**0.0**	50.5	**0.016**	1.55	**0.00**	0.00	**0.00**	0.80	**1.24**	0.00	**0.00**	0.31
					Mobile Homes	2.621	**0.0**	65.0	**0.042**	0.45	**0.00**	0.00	**0.00**	0.80	**0.36**	0.00	**0.00**	0.09
					Recreational	5.349	**0.0**	76.7	**0.090**	1.99	**0.00**	0.00	**0.00**	0.80	**1.59**	0.00	**0.00**	0.40
					Transportation	6.286	**58.4**	47.4	**0.478**	12.44	**0.00**	0.00	**0.00**	0.80	**9.95**	0.00	**0.00**	2.49
					Upland Mixed	10.928	**0.0**	65.3	**0.043**	1.94	**0.00**	0.00	**0.00**	0.80	**1.55**	0.00	**0.00**	0.39
	LYW 03-03	None	**None**	3	**Commercial**	1.306	**26.2**	52.3	**0.226**	1.22	**0.00**	0.00	**0.00**	0.50	**0.61**	0.00	**0.00**	0.61
					LDR	3.002	**0.0**	82.3	**0.134**	1.66	**0.00**	0.00	**0.00**	0.50	**0.83**	0.00	**0.00**	0.83
					MDR	6.076	**0.0**	60.1	**0.031**	0.77	**0.00**	0.00	**0.00**	0.50	**0.39**	0.00	**0.00**	0.39
					Nurseries	3.027	**0.0**	97.3	**0.547**	6.86	**0.00**	0.00	**0.00**	0.50	**3.43**	0.00	**0.00**	3.43
					Pine Flatwoods	3.964	**0.0**	77.0	**0.092**	1.51	**0.00**	0.00	**0.00**	0.50	**0.75**	0.00	**0.00**	0.75
					Upland Mixed	16.209	**0.0**	71.0	**0.062**	4.14	**0.00**	0.00	**0.00**	0.50	**2.07**	0.00	**0.00**	2.07
					Upland Nonforested	0.989	**0.0**	82.0	**0.130**	0.53	**0.00**	0.00	**0.00**	0.50	**0.27**	0.00	**0.00**	0.27
					Wet Prairies	3.778	**0.0**	73.0	**0.071**	1.10	**0.00**	0.00	**0.00**	0.50	**0.55**	1.00	**0.55**	0.00
	LYW 03-03a	None	**None**	2	**Citrus Groves**	12.583	**0.0**	43.0	**0.009**	0.47	**0.00**	0.00	**0.00**	0.25	**0.12**	0.00	**0.00**	0.35
					LDR	0.979	**0.0**	54.8	**0.022**	0.09	**0.00**	0.00	**0.00**	0.25	**0.02**	0.00	**0.00**	0.07
					Pasture	3.549	**0.0**	56.6	**0.025**	0.36	**0.00**	0.00	**0.00**	0.25	**0.09**	0.00	**0.00**	0.27
					Transportation	1.361	**0.0**	65.6	**0.044**	0.25	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.18
					Wet Prairies	1.090	**0.0**	73.0	**0.071**	0.32	**0.00**	0.00	**0.00**	0.25	**0.08**	1.00	**0.24**	0.00
	LYW 03-03b	Dry Pond	**None**	4	**Commercial**	0.970	**28.0**	62.0	**0.252**	1.01	**0.80**	0.00	**0.81**	0.65	**0.13**	0.00	**0.00**	0.07
		None	**None**	4	**Commercial**	0.941	**0.0**	44.7	**0.010**	0.04	**0.00**	0.00	**0.00**	0.65	**0.03**	0.00	**0.00**	0.01
					Industrial	1.144	**0.0**	70.5	**0.059**	0.28	**0.00**	0.00	**0.00**	0.65	**0.18**	0.00	**0.00**	0.10
					Institutional	0.964	**0.0**	65.3	**0.043**	0.17	**0.00**	0.00	**0.00**	0.65	**0.11**	0.00	**0.00**	0.06
					LDR	1.428	**0.0**	72.3	**0.068**	0.40	**0.00**	0.00	**0.00**	0.65	**0.26**	0.00	**0.00**	0.14
					MDR	21.229	**0.0**	55.3	**0.022**	1.97	**0.00**	0.00	**0.00**	0.65	**1.28**	0.00	**0.00**	0.69
					Pasture	3.828	**0.0**	82.7	**0.137**	2.17	**0.00**	0.00	**0.00**	0.65	**1.41**	0.00	**0.00**	0.76

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
LYW 01-01	**LYW 03-03b**	None	**None**	4	**Transportation**	0.432	**0.0**	64.2	**0.040**	0.07	**0.00**	0.00	**0.00**	0.65	**0.05**	0.00	**0.00**	0.03
					Upland Mixed	14.216	**0.0**	75.0	**0.079**	4.67	**0.00**	0.00	**0.00**	0.65	**3.03**	0.00	**0.00**	1.63
					Wet Prairies	4.332	**0.0**	73.0	**0.071**	1.26	**0.00**	0.00	**0.00**	0.65	**0.82**	1.00	**0.44**	0.00
	LYW 03-3c	Swale	**None**	0	**Commercial**	3.639	**0.0**	63.8	**0.039**	0.59	**0.20**	0.00	**0.12**	0.00	**0.00**	0.00	**0.00**	0.47
					Industrial	0.444	**0.0**	63.1	**0.038**	0.07	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.06
					Institutional	0.300	**0.0**	68.8	**0.054**	0.07	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.05
					LDR	1.404	**0.0**	75.6	**0.083**	0.48	**0.20**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.39
					MDR	0.502	**0.0**	53.7	**0.020**	0.04	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.03
					Mobile Homes	1.224	**0.0**	64.3	**0.040**	0.20	**0.20**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.16
					Pasture	0.689	**0.0**	80.4	**0.115**	0.33	**0.20**	0.00	**0.07**	0.00	**0.00**	0.00	**0.00**	0.26
					Transportation	11.799	**0.0**	72.3	**0.068**	3.30	**0.20**	0.00	**0.66**	0.00	**0.00**	0.00	**0.00**	2.64
					Upland Mixed	0.398	**0.0**	77.0	**0.092**	0.15	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.12
					Upland Nonforested	2.708	**0.0**	80.3	**0.114**	1.27	**0.20**	0.00	**0.25**	0.00	**0.00**	0.00	**0.00**	1.02
					Wet Prairies	0.185	**0.0**	73.0	**0.071**	0.05	**0.20**	0.00	**0.01**	0.00	**0.00**	1.00	**0.04**	0.00

F.2 Trout Lake

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 01-01**	None	**None**	0	**Commercial**	1.218	**4.2**	46.8	**0.046**	0.23	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.23
					Pasture	3.431	**0.0**	56.5	**0.024**	0.35	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.35
					Pine Flatwoods	3.422	**0.0**	47.1	**0.012**	0.18	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.18
		Swale	**None**	0	**Transportation**	1.513	**0.0**	67.4	**0.049**	0.31	**0.20**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.25
	HD 01-02a	None	**None**	1	**Pasture**	8.655	**0.0**	74.9	**0.079**	2.82	**0.00**	0.00	**0.00**	0.10	**0.28**	0.00	**0.00**	2.53
					Pine Flatwoods	5.651	**0.0**	77.0	**0.092**	2.15	**0.00**	0.00	**0.00**	0.10	**0.21**	0.00	**0.00**	1.93
					Upland Nonforested	2.580	**0.0**	82.0	**0.130**	1.39	**0.00**	0.00	**0.00**	0.10	**0.14**	0.00	**0.00**	1.25
	HD 01-02b	None	**None**	1	**Institutional**	0.069	**0.0**	61.0	**0.033**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
					LDR	0.219	**0.0**	80.9	**0.120**	0.11	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.10
					Pasture	96.300	**0.0**	81.7	**0.128**	50.98	**0.00**	0.00	**0.00**	0.10	**5.10**	0.00	**0.00**	45.88
					Pine Flatwoods	17.769	**0.0**	76.7	**0.090**	6.59	**0.00**	0.00	**0.00**	0.10	**0.66**	0.00	**0.00**	5.94
					Transportation	0.140	**0.0**	42.6	**0.009**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	33.863	**0.0**	77.0	**0.092**	12.88	**0.00**	0.00	**0.00**	0.10	**1.29**	0.00	**0.00**	11.59
					Wetlands	58.512	**0.0**	77.0	**0.092**	22.25	**0.00**	0.00	**0.00**	0.10	**2.22**	1.00	**20.02**	0.00
	HD 01-03a	None	**None**	1	**Pasture**	20.667	**0.0**	75.5	**0.083**	7.06	**0.00**	0.00	**0.00**	0.10	**0.71**	0.00	**0.00**	6.35
					Pine Flatwoods	1.178	**0.0**	50.8	**0.016**	0.08	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.07
					Transportation	1.399	**0.0**	73.1	**0.071**	0.41	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.37
					Wetlands	0.529	**0.0**	77.0	**0.092**	0.20	**0.00**	0.00	**0.00**	0.10	**0.02**	1.00	**0.18**	0.00
	HD 01-03b	None	**None**	1	**Pine Flatwoods**	6.260	**0.0**	77.0	**0.092**	2.38	**0.00**	0.00	**0.00**	0.10	**0.24**	0.00	**0.00**	2.14
					Shrub and Brushland	0.814	**0.0**	73.0	**0.071**	0.24	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.21
					Upland Nonforested	8.943	**0.0**	82.0	**0.130**	4.83	**0.00**	0.00	**0.00**	0.10	**0.48**	0.00	**0.00**	4.34
	HD 01-03c	None	**None**	1	**Pasture**	15.106	**0.0**	84.0	**0.150**	9.38	**0.00**	0.00	**0.00**	0.10	**0.94**	0.00	**0.00**	8.44
					Upland Mixed	7.511	**0.0**	77.0	**0.092**	2.86	**0.00**	0.00	**0.00**	0.10	**0.29**	0.00	**0.00**	2.57
					Wetlands	9.972	**0.0**	77.0	**0.092**	3.79	**0.00**	0.00	**0.00**	0.10	**0.38**	1.00	**3.41**	0.00
	HD 01-03d	None	**None**	2	**LDR**	14.606	**0.0**	65.0	**0.042**	2.53	**0.00**	0.00	**0.00**	0.25	**0.63**	0.00	**0.00**	1.90
					Pasture	24.298	**0.0**	84.0	**0.150**	15.08	**0.00**	0.00	**0.00**	0.25	**3.77**	0.00	**0.00**	11.31
					Pine Flatwoods	0.593	**0.0**	77.0	**0.092**	0.23	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.17
					Upland Mixed	0.722	**0.0**	30.2	**0.002**	0.01	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.01
					Wet Prairies	1.422	**0.0**	73.0	**0.071**	0.41	**0.00**	0.00	**0.00**	0.25	**0.10**	1.00	**0.31**	0.00
					Wetlands	4.180	**0.0**	77.0	**0.092**	1.59	**0.00**	0.00	**0.00**	0.25	**0.40**	1.00	**1.19**	0.00
	HD 01-03e	None	**None**	1	**Pasture**	5.284	**0.0**	84.0	**0.150**	3.28	**0.00**	0.00	**0.00**	0.10	**0.33**	0.00	**0.00**	2.95
					Pine Flatwoods	1.087	**0.0**	77.0	**0.092**	0.41	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.37
					Upland Mixed	2.900	**0.0**	77.0	**0.092**	1.10	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.99
	HD 01-03f	None	**None**	0	**Institutional**	3.401	**3.5**	60.6	**0.059**	0.84	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.84
					LDR	1.279	**0.0**	80.9	**0.120**	0.63	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.63
					Pasture	7.335	**0.0**	84.0	**0.150**	4.55	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	4.55
					Recreational	0.189	**0.0**	80.0	**0.111**	0.09	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.09
					Upland Mixed	1.158	**0.0**	77.0	**0.092**	0.44	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.44
					Wetlands	0.158	**0.0**	77.0	**0.092**	0.06	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**0.06**	0.00
		Swale	**None**	0	**Transportation**	0.905	**0.0**	72.9	**0.070**	0.26	**0.20**	0.00	**0.05**	0.00	**0.00**	0.00	**0.00**	0.21
	HD 01-03g	Dry Pond	**None**	0	**Commercial**	2.284	**28.3**	62.3	**0.255**	2.41	**0.80**	0.00	**1.93**	0.00	**0.00**	0.00	**0.00**	0.48
					Pasture	0.580	**0.0**	49.0	**0.014**	0.03	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
					Pine Flatwoods	0.125	**0.0**	30.0	**0.002**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	HD 01-04a	None	**None**	1	**Pasture**	3.323	**0.0**	84.0	**0.150**	2.06	**0.00**	0.00	**0.00**	0.10	**0.21**	0.00	**0.00**	1.86
					Transportation	0.641	**0.0**	76.0	**0.085**	0.23	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.20
					Wetlands	0.683	**0.0**	77.0	**0.092**	0.26	**0.00**	0.00	**0.00**	0.10	**0.03**	1.00	**0.23**	0.00
	HD 01-04b	None	**None**	1	**LDR**	6.693	**0.0**	79.3	**0.106**	2.95	**0.00**	0.00	**0.00**	0.10	**0.29**	0.00	**0.00**	2.65
					MDR	7.721	**0.0**	83.0	**0.140**	4.47	**0.00**	0.00	**0.00**	0.10	**0.45**	0.00	**0.00**	4.02
					Pasture	1.948	**0.0**	82.3	**0.133**	1.07	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.97
					Pine Flatwoods	47.500	**0.0**	77.0	**0.092**	18.03	**0.00**	0.00	**0.00**	0.10	**1.80**	0.00	**0.00**	16.23
					Recreational	5.050	**0.0**	71.4	**0.063**	1.33	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.19
					Shrub and Brushland	0.873	**0.0**	73.0	**0.071**	0.25	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.23
					Upland Mixed	1.015	**0.0**	30.0	**0.002**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
					Upland Nonforested	16.110	**0.0**	73.8	**0.074**	4.94	**0.00**	0.00	**0.00**	0.10	**0.49**	0.00	**0.00**	4.45
					Wetlands	63.197	**0.0**	77.0	**0.092**	24.03	**0.00**	0.00	**0.00**	0.10	**2.40**	1.00	**21.63**	0.00
	HD 01-04c	Wet Pond	**None**	0	**Institutional**	2.488	**19.6**	68.5	**0.201**	2.07	**0.20**	0.00	**0.41**	0.00	**0.00**	0.00	**0.00**	1.66

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 01-04d**	Dry Pond	**None**	2	**Transportation**	0.034	**0.0**	46.2	**0.012**	0.00	**0.80**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.00
		None	**None**	2	**LDR**	1.889	**0.0**	82.7	**0.137**	1.07	**0.00**	0.00	**0.00**	0.25	**0.27**	0.00	**0.00**	0.80
					MDR	39.866	**0.0**	58.6	**0.028**	4.64	**0.00**	0.00	**0.00**	0.25	**1.16**	0.00	**0.00**	3.48
					Pasture	30.701	**0.0**	58.8	**0.028**	3.60	**0.00**	0.00	**0.00**	0.25	**0.90**	0.00	**0.00**	2.70
					Upland Mixed	57.556	**0.0**	54.4	**0.021**	5.01	**0.00**	0.00	**0.00**	0.25	**1.25**	0.00	**0.00**	3.76
					Upland Nonforested	3.470	**0.0**	72.9	**0.070**	1.01	**0.00**	0.00	**0.00**	0.25	**0.25**	0.00	**0.00**	0.75
					Wet Prairies	1.403	**0.0**	73.0	**0.071**	0.41	**0.00**	0.00	**0.00**	0.25	**0.10**	1.00	**0.31**	0.00
					Wetlands	8.195	**0.0**	77.0	**0.092**	3.12	**0.00**	0.00	**0.00**	0.25	**0.78**	1.00	**2.34**	0.00
	HD 01-05a	None	**None**	2	**Pasture**	8.828	**0.0**	83.5	**0.145**	5.31	**0.00**	0.00	**0.00**	0.25	**1.33**	0.00	**0.00**	3.98
					Pine Flatwoods	0.384	**0.0**	77.0	**0.092**	0.15	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.11
					Transportation	0.455	**0.0**	84.1	**0.151**	0.28	**0.00**	0.00	**0.00**	0.25	**0.07**	0.00	**0.00**	0.21
					Wetlands	1.843	**0.0**	77.0	**0.092**	0.70	**0.00**	0.00	**0.00**	0.25	**0.18**	1.00	**0.53**	0.00
	HD 01-05b	Wet Pond	**None**	3	**MDR**	21.658	**0.0**	62.5	**0.036**	3.25	**0.20**	0.00	**0.65**	0.50	**1.30**	0.00	**0.00**	1.30
					Pine Flatwoods	0.144	**0.0**	77.0	**0.092**	0.05	**0.20**	0.00	**0.01**	0.50	**0.02**	0.00	**0.00**	0.02
					Wetlands	0.004	**0.0**	77.0	**0.092**	0.00	**0.20**	0.00	**0.00**	0.50	**0.00**	1.00	**0.00**	0.00
	HD 02-01	None	**None**	0	**MDR**	0.299	**0.0**	68.4	**0.053**	0.06	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.06
					Pasture	6.084	**0.0**	84.0	**0.150**	3.78	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	3.78
					Pine Flatwoods	4.706	**0.0**	77.0	**0.092**	1.79	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.79
					Recreational	0.089	**0.0**	67.6	**0.050**	0.02	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Upland Nonforested	67.190	**0.0**	81.5	**0.126**	34.96	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	34.96
					Wet Prairies	0.755	**0.0**	73.0	**0.071**	0.22	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**0.22**	0.00
					Wetlands	6.585	**0.0**	77.0	**0.092**	2.50	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**2.50**	0.00
	HD 02-02a	None	**None**	1	**Recreational**	0.537	**0.0**	67.6	**0.050**	0.11	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.10
					Upland Nonforested	17.167	**0.0**	80.9	**0.120**	8.50	**0.00**	0.00	**0.00**	0.10	**0.85**	0.00	**0.00**	7.65
	HD 03-01	None	**None**	0	**MDR**	1.570	**0.0**	78.4	**0.101**	0.66	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.66
					Pasture	5.007	**0.0**	84.0	**0.150**	3.11	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	3.11
					Upland Mixed	5.623	**0.0**	76.8	**0.091**	2.11	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.11
					Upland Nonforested	17.551	**0.0**	81.3	**0.123**	8.95	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	8.95
					Wet Prairies	21.419	**0.0**	73.0	**0.071**	6.25	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**6.25**	0.00
					Wetlands	7.853	**0.0**	77.0	**0.092**	2.99	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**2.99**	0.00
	HD 03-02a	None	**None**	2	**Recreational**	0.417	**0.0**	80.0	**0.111**	0.19	**0.00**	0.00	**0.00**	0.25	**0.05**	0.00	**0.00**	0.14
					Upland Nonforested	6.272	**0.0**	81.5	**0.125**	3.25	**0.00**	0.00	**0.00**	0.25	**0.81**	0.00	**0.00**	2.44
	HD 03-02b	None	**None**	2	**MDR**	3.564	**0.0**	65.1	**0.042**	0.63	**0.00**	0.00	**0.00**	0.25	**0.16**	0.00	**0.00**	0.47
					Upland Mixed	0.661	**0.0**	49.9	**0.015**	0.04	**0.00**	0.00	**0.00**	0.25	**0.01**	0.00	**0.00**	0.03
					Upland Nonforested	6.791	**0.0**	76.4	**0.088**	2.47	**0.00**	0.00	**0.00**	0.25	**0.62**	0.00	**0.00**	1.85
	HD 03-02c	None	**None**	1	**Pasture**	4.414	**0.0**	84.0	**0.150**	2.74	**0.00**	0.00	**0.00**	0.10	**0.27**	0.00	**0.00**	2.47
					Upland Nonforested	0.205	**0.0**	82.0	**0.130**	0.11	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.10
	HD 03-02d	None	**None**	3	**Upland Nonforested**	0.869	**0.0**	82.0	**0.130**	0.47	**0.00**	0.00	**0.00**	0.50	**0.23**	0.00	**0.00**	0.23
	HD 03-03a	None	**None**	4	**MDR**	19.647	**0.0**	62.5	**0.036**	2.94	**0.00**	0.00	**0.00**	0.65	**1.91**	0.00	**0.00**	1.03
					Upland Mixed	2.137	**0.0**	77.0	**0.092**	0.81	**0.00**	0.00	**0.00**	0.65	**0.53**	0.00	**0.00**	0.28
					Upland Nonforested	1.421	**0.0**	43.0	**0.009**	0.05	**0.00**	0.00	**0.00**	0.65	**0.03**	0.00	**0.00**	0.02
	HD 03-04a	None	**None**	3	**LDR**	0.105	**0.0**	81.4	**0.124**	0.05	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					MDR	2.485	**0.0**	53.8	**0.020**	0.21	**0.00**	0.00	**0.00**	0.50	**0.10**	0.00	**0.00**	0.10
					Shrub and Brushland	0.666	**0.0**	57.0	**0.025**	0.07	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					Upland Mixed	9.505	**0.0**	61.5	**0.034**	1.33	**0.00**	0.00	**0.00**	0.50	**0.67**	0.00	**0.00**	0.67
					Upland Nonforested	11.334	**0.0**	54.7	**0.021**	1.01	**0.00**	0.00	**0.00**	0.50	**0.50**	0.00	**0.00**	0.50
	HD 03-04b	None	**None**	5	**MDR**	34.100	**0.0**	67.4	**0.049**	6.96	**0.00**	0.00	**0.00**	0.80	**5.56**	0.00	**0.00**	1.39
	HD 03-04c	None	**None**	2	**MDR**	10.530	**0.0**	55.0	**0.022**	0.95	**0.00**	0.00	**0.00**	0.25	**0.24**	0.00	**0.00**	0.72
					Recreational	0.338	**0.0**	66.7	**0.047**	0.07	**0.00**	0.00	**0.00**	0.25	**0.02**	0.00	**0.00**	0.05
					Upland Nonforested	4.587	**0.0**	65.5	**0.043**	0.82	**0.00**	0.00	**0.00**	0.25	**0.21**	0.00	**0.00**	0.62
	HD 03-05a	None	**None**	1	**MDR**	2.262	**0.0**	46.5	**0.012**	0.11	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.10
					Recreational	0.703	**0.0**	73.5	**0.073**	0.21	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.19
					Upland Mixed	3.913	**0.0**	69.5	**0.056**	0.90	**0.00**	0.00	**0.00**	0.10	**0.09**	0.00	**0.00**	0.81
					Upland Nonforested	0.016	**0.0**	43.0	**0.009**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
	HD 03-05b	None	**None**	2	**LDR**	1.746	**0.0**	63.8	**0.039**	0.28	**0.00**	0.00	**0.00**	0.25	**0.07**	0.00	**0.00**	0.21
					Upland Mixed	1.564	**0.0**	63.8	**0.039**	0.25	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.19

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 04-01**	None	**None**	1	**Pasture**	0.010	**0.0**	84.0	**0.150**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
					Pine Flatwoods	0.117	**0.0**	77.0	**0.092**	0.04	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					Upland Nonforested	1.413	**0.0**	82.0	**0.130**	0.76	**0.00**	0.00	**0.00**	0.10	**0.08**	0.00	**0.00**	0.69
					Wet Prairies	4.645	**0.0**	73.0	**0.071**	1.36	**0.00**	0.00	**0.00**	0.10	**0.14**	1.00	**1.22**	0.00
					Wetlands	0.055	**0.0**	77.0	**0.092**	0.02	**0.00**	0.00	**0.00**	0.10	**0.00**	1.00	**0.02**	0.00
	HD 04-02a	None	**None**	0	**Pasture**	74.550	**0.0**	82.1	**0.131**	40.43	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	40.43
					Pine Flatwoods	8.686	**0.0**	61.1	**0.033**	1.19	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.19
					Upland Hardwood	5.365	**0.0**	68.8	**0.054**	1.19	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.19
					Upland Mixed	11.875	**0.0**	75.8	**0.084**	4.13	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	4.13
					Upland Nonforested	4.808	**0.0**	82.0	**0.130**	2.60	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.60
					Wet Prairies	228.938	**0.0**	73.0	**0.071**	66.82	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**66.82**	0.00
					Wetlands	25.491	**0.0**	77.0	**0.092**	9.69	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**9.69**	0.00
	HD 04-02b	None	**None**	2	**MDR**	6.962	**0.0**	82.3	**0.133**	3.84	**0.00**	0.00	**0.00**	0.25	**0.96**	0.00	**0.00**	2.88
					Pine Flatwoods	2.906	**0.0**	77.0	**0.092**	1.10	**0.00**	0.00	**0.00**	0.25	**0.28**	0.00	**0.00**	0.83
					Upland Mixed	3.438	**0.0**	77.0	**0.092**	1.31	**0.00**	0.00	**0.00**	0.25	**0.33**	0.00	**0.00**	0.98
					Upland Nonforested	4.101	**0.0**	82.0	**0.130**	2.21	**0.00**	0.00	**0.00**	0.25	**0.55**	0.00	**0.00**	1.66
					Wet Prairies	3.941	**0.0**	73.0	**0.071**	1.15	**0.00**	0.00	**0.00**	0.25	**0.29**	1.00	**0.86**	0.00
					Wetlands	2.915	**0.0**	77.0	**0.092**	1.11	**0.00**	0.00	**0.00**	0.25	**0.28**	1.00	**0.83**	0.00
	HD 05-01	None	**None**	0	**Wet Prairies**	13.031	**0.0**	73.0	**0.071**	3.80	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**3.80**	0.00
	HD 05-02a	None	**None**	1	**Wet Prairies**	7.946	**0.0**	73.0	**0.071**	2.32	**0.00**	0.00	**0.00**	0.10	**0.23**	1.00	**2.09**	0.00
					Wetlands	4.983	**0.0**	77.0	**0.092**	1.89	**0.00**	0.00	**0.00**	0.10	**0.19**	1.00	**1.71**	0.00
	HD 05-02b	None	**None**	1	**Wet Prairies**	85.041	**0.0**	73.0	**0.071**	24.82	**0.00**	0.00	**0.00**	0.10	**2.48**	1.00	**22.34**	0.00
	HD 05-02c	None	**None**	1	**Wet Prairies**	83.652	**0.0**	73.0	**0.071**	24.42	**0.00**	0.00	**0.00**	0.10	**2.44**	1.00	**21.98**	0.00
	HD 05-03a	None	**None**	1	**LDR**	1.065	**0.0**	81.5	**0.125**	0.55	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.50
					MDR	0.412	**0.0**	75.6	**0.083**	0.14	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.13
					Pine Flatwoods	3.995	**0.0**	77.0	**0.092**	1.52	**0.00**	0.00	**0.00**	0.10	**0.15**	0.00	**0.00**	1.37
					Upland Mixed	7.263	**0.0**	77.0	**0.092**	2.76	**0.00**	0.00	**0.00**	0.10	**0.28**	0.00	**0.00**	2.49
					Upland Nonforested	1.046	**0.0**	82.0	**0.130**	0.56	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.51
					Wet Prairies	31.803	**0.0**	73.0	**0.071**	9.28	**0.00**	0.00	**0.00**	0.10	**0.93**	1.00	**8.35**	0.00
					Wetlands	17.735	**0.0**	77.0	**0.092**	6.74	**0.00**	0.00	**0.00**	0.10	**0.67**	1.00	**6.07**	0.00
	HD 05-03b	None	**None**	1	**LDR**	5.314	**0.0**	81.1	**0.121**	2.67	**0.00**	0.00	**0.00**	0.10	**0.27**	0.00	**0.00**	2.40
					MDR	1.352	**0.0**	82.2	**0.132**	0.74	**0.00**	0.00	**0.00**	0.10	**0.07**	0.00	**0.00**	0.67
					Transportation	3.855	**0.0**	82.1	**0.131**	2.09	**0.00**	0.00	**0.00**	0.10	**0.21**	0.00	**0.00**	1.88
					Upland Mixed	26.494	**0.0**	76.4	**0.088**	9.64	**0.00**	0.00	**0.00**	0.10	**0.96**	0.00	**0.00**	8.68
					Upland Nonforested	1.136	**0.0**	82.0	**0.130**	0.61	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.55
					Wet Prairies	110.659	**0.0**	73.0	**0.071**	32.30	**0.00**	0.00	**0.00**	0.10	**3.23**	1.00	**29.07**	0.00
					Wetlands	173.039	**0.0**	77.0	**0.092**	65.80	**0.00**	0.00	**0.00**	0.10	**6.58**	1.00	**59.22**	0.00
	HD 05-04a	None	**None**	3	**MDR**	7.681	**0.0**	64.6	**0.041**	1.31	**0.00**	0.00	**0.00**	0.50	**0.65**	0.00	**0.00**	0.65
					Upland Mixed	2.500	**0.0**	71.1	**0.062**	0.65	**0.00**	0.00	**0.00**	0.50	**0.32**	0.00	**0.00**	0.32
					Upland Nonforested	0.205	**0.0**	82.0	**0.130**	0.11	**0.00**	0.00	**0.00**	0.50	**0.06**	0.00	**0.00**	0.06
	HD 05-04b	None	**None**	2	**LDR**	0.038	**0.0**	80.0	**0.111**	0.02	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.01
					Upland Mixed	2.202	**0.0**	77.0	**0.092**	0.84	**0.00**	0.00	**0.00**	0.25	**0.21**	0.00	**0.00**	0.63
	HD 05-04c	None	**None**	4	**MDR**	5.992	**0.0**	63.9	**0.039**	0.98	**0.00**	0.00	**0.00**	0.65	**0.63**	0.00	**0.00**	0.34
					Pine Flatwoods	14.909	**0.0**	77.0	**0.092**	5.67	**0.00**	0.00	**0.00**	0.65	**3.69**	0.00	**0.00**	1.98
					Upland Mixed	14.659	**0.0**	75.6	**0.083**	5.02	**0.00**	0.00	**0.00**	0.65	**3.26**	0.00	**0.00**	1.76
					Wet Prairies	11.066	**0.0**	73.0	**0.071**	3.23	**0.00**	0.00	**0.00**	0.65	**2.10**	1.00	**1.13**	0.00
					Wetlands	3.378	**0.0**	77.0	**0.092**	1.28	**0.00**	0.00	**0.00**	0.65	**0.83**	1.00	**0.45**	0.00
	HD 05-04d	None	**None**	2	**Pine Flatwoods**	17.733	**0.0**	71.3	**0.063**	4.65	**0.00**	0.00	**0.00**	0.25	**1.16**	0.00	**0.00**	3.49
					Upland Mixed	7.385	**0.0**	55.0	**0.022**	0.67	**0.00**	0.00	**0.00**	0.25	**0.17**	0.00	**0.00**	0.50
					Wet Prairies	7.528	**0.0**	73.0	**0.071**	2.20	**0.00**	0.00	**0.00**	0.25	**0.55**	1.00	**1.65**	0.00
	HD 05-04e	None	**None**	1	**LDR**	0.008	**0.0**	81.8	**0.128**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Pine Flatwoods	8.101	**0.0**	77.0	**0.092**	3.08	**0.00**	0.00	**0.00**	0.10	**0.31**	0.00	**0.00**	2.77
					Upland Mixed	18.683	**0.0**	77.0	**0.092**	7.10	**0.00**	0.00	**0.00**	0.10	**0.71**	0.00	**0.00**	6.39
					Wet Prairies	21.891	**0.0**	73.0	**0.071**	6.39	**0.00**	0.00	**0.00**	0.10	**0.64**	1.00	**5.75**	0.00
					Wetlands	8.931	**0.0**	77.0	**0.092**	3.40	**0.00**	0.00	**0.00**	0.10	**0.34**	1.00	**3.06**	0.00
	HD 05-04f	None	**None**	2	**Dairies**	0.227	**0.0**	98.0	**0.595**	0.56	**0.00**	0.00	**0.00**	0.25	**0.14**	0.00	**0.00**	0.42

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 05-04f**	None	**None**	2	**MDR**	0.669	**0.0**	52.0	**0.018**	0.05	**0.00**	0.00	**0.00**	0.25	**0.01**	0.00	**0.00**	0.04
					Pasture	79.843	**0.0**	84.0	**0.150**	49.55	**0.00**	0.00	**0.00**	0.25	**12.39**	0.00	**0.00**	37.17
					Pine Flatwoods	0.001	**0.0**	77.0	**0.092**	0.00	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.00
					Transportation	1.148	**0.0**	62.3	**0.036**	0.17	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.13
					Upland Mixed	18.943	**0.0**	77.0	**0.092**	7.20	**0.00**	0.00	**0.00**	0.25	**1.80**	0.00	**0.00**	5.40
					Upland Nonforested	1.048	**0.0**	82.0	**0.130**	0.57	**0.00**	0.00	**0.00**	0.25	**0.14**	0.00	**0.00**	0.42
					Wet Prairies	47.695	**0.0**	73.0	**0.071**	13.92	**0.00**	0.00	**0.00**	0.25	**3.48**	1.00	**10.44**	0.00
					Wetlands	46.162	**0.0**	77.0	**0.092**	17.55	**0.00**	0.00	**0.00**	0.25	**4.39**	1.00	**13.16**	0.00
		Swale	**None**	2	**Pasture**	7.168	**0.0**	84.0	**0.150**	4.45	**0.20**	0.00	**0.89**	0.25	**0.89**	0.00	**0.00**	2.67
					Pine Flatwoods	0.107	**0.0**	77.0	**0.092**	0.04	**0.20**	0.00	**0.01**	0.25	**0.01**	0.00	**0.00**	0.02
					Transportation	4.296	**0.0**	73.3	**0.072**	1.28	**0.20**	0.00	**0.26**	0.25	**0.26**	0.00	**0.00**	0.77
					Upland Mixed	0.251	**0.0**	77.0	**0.092**	0.10	**0.20**	0.00	**0.02**	0.25	**0.02**	0.00	**0.00**	0.06
					Upland Nonforested	0.408	**0.0**	82.0	**0.130**	0.22	**0.20**	0.00	**0.04**	0.25	**0.04**	0.00	**0.00**	0.13
					Wetlands	0.932	**0.0**	77.0	**0.092**	0.35	**0.20**	0.00	**0.07**	0.25	**0.07**	1.00	**0.21**	0.00
	HD 05-04g	None	**None**	2	**LDR**	0.640	**0.0**	84.9	**0.158**	0.42	**0.00**	0.00	**0.00**	0.25	**0.10**	0.00	**0.00**	0.31
					Nurseries	7.898	**0.0**	83.8	**0.148**	4.85	**0.00**	0.00	**0.00**	0.25	**1.21**	0.00	**0.00**	3.64
					Pasture	9.440	**0.0**	84.0	**0.150**	5.86	**0.00**	0.00	**0.00**	0.25	**1.46**	0.00	**0.00**	4.39
					Transportation	3.555	**0.0**	83.0	**0.140**	2.06	**0.00**	0.00	**0.00**	0.25	**0.52**	0.00	**0.00**	1.55
					Upland Mixed	19.115	**0.0**	74.7	**0.078**	6.17	**0.00**	0.00	**0.00**	0.25	**1.54**	0.00	**0.00**	4.63
					Upland Nonforested	1.375	**0.0**	82.0	**0.130**	0.74	**0.00**	0.00	**0.00**	0.25	**0.19**	0.00	**0.00**	0.56
					Utilities	0.437	**0.0**	82.0	**0.130**	0.24	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.18
					Wet Prairies	34.342	**0.0**	73.0	**0.071**	10.02	**0.00**	0.00	**0.00**	0.25	**2.51**	1.00	**7.52**	0.00
					Wetlands	51.461	**0.0**	77.0	**0.092**	19.57	**0.00**	0.00	**0.00**	0.25	**4.89**	1.00	**14.68**	0.00
		Swale	**None**	2	**Citrus Groves**	0.364	**0.0**	51.7	**0.018**	0.03	**0.20**	0.00	**0.01**	0.25	**0.01**	0.00	**0.00**	0.02
					Nurseries	0.331	**0.0**	80.7	**0.117**	0.16	**0.20**	0.00	**0.03**	0.25	**0.03**	0.00	**0.00**	0.10
					Transportation	1.456	**0.0**	76.8	**0.091**	0.55	**0.20**	0.00	**0.11**	0.25	**0.11**	0.00	**0.00**	0.33
					Upland Nonforested	0.080	**0.0**	82.0	**0.130**	0.04	**0.20**	0.00	**0.01**	0.25	**0.01**	0.00	**0.00**	0.03
					Utilities	0.361	**0.0**	82.0	**0.130**	0.20	**0.20**	0.00	**0.04**	0.25	**0.04**	0.00	**0.00**	0.12
					Wetlands	0.333	**0.0**	77.0	**0.092**	0.13	**0.20**	0.00	**0.03**	0.25	**0.03**	1.00	**0.08**	0.00
	HD 05-05a	None	**None**	1	**Pasture**	0.665	**0.0**	84.0	**0.150**	0.41	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.37
					Pine Flatwoods	11.538	**0.0**	75.8	**0.084**	4.03	**0.00**	0.00	**0.00**	0.10	**0.40**	0.00	**0.00**	3.63
					Upland Mixed	3.308	**0.0**	73.1	**0.071**	0.97	**0.00**	0.00	**0.00**	0.10	**0.10**	0.00	**0.00**	0.87
					Wet Prairies	3.920	**0.0**	73.0	**0.071**	1.14	**0.00**	0.00	**0.00**	0.10	**0.11**	1.00	**1.03**	0.00
					Wetlands	1.506	**0.0**	77.0	**0.092**	0.57	**0.00**	0.00	**0.00**	0.10	**0.06**	1.00	**0.52**	0.00
	HD 05-05b	None	**None**	1	**Wet Prairies**	1.474	**0.0**	73.0	**0.071**	0.43	**0.00**	0.00	**0.00**	0.10	**0.04**	1.00	**0.39**	0.00
	HD 05-05c	None	**None**	2	**LDR**	2.892	**0.0**	81.8	**0.128**	1.54	**0.00**	0.00	**0.00**	0.25	**0.38**	0.00	**0.00**	1.15
					Upland Mixed	7.711	**0.0**	77.0	**0.092**	2.93	**0.00**	0.00	**0.00**	0.25	**0.73**	0.00	**0.00**	2.20
					Wet Prairies	4.550	**0.0**	73.0	**0.071**	1.33	**0.00**	0.00	**0.00**	0.25	**0.33**	1.00	**1.00**	0.00
					Wetlands	0.438	**0.0**	77.0	**0.092**	0.17	**0.00**	0.00	**0.00**	0.25	**0.04**	1.00	**0.12**	0.00
	HD 05-05d	None	**None**	3	**Citrus Groves**	23.364	**0.0**	56.9	**0.025**	2.43	**0.00**	0.00	**0.00**	0.50	**1.21**	0.00	**0.00**	1.21
					LDR	10.085	**0.0**	77.6	**0.096**	4.00	**0.00**	0.00	**0.00**	0.50	**2.00**	0.00	**0.00**	2.00
					MDR	33.867	**0.0**	67.4	**0.050**	6.95	**0.00**	0.00	**0.00**	0.50	**3.47**	0.00	**0.00**	3.47
					Pasture	4.486	**0.0**	84.0	**0.150**	2.78	**0.00**	0.00	**0.00**	0.50	**1.39**	0.00	**0.00**	1.39
					Pine Flatwoods	36.900	**0.0**	71.6	**0.064**	9.82	**0.00**	0.00	**0.00**	0.50	**4.91**	0.00	**0.00**	4.91
					Upland Mixed	40.564	**0.0**	72.2	**0.067**	11.22	**0.00**	0.00	**0.00**	0.50	**5.61**	0.00	**0.00**	5.61
					Upland Nonforested	20.349	**0.0**	80.4	**0.114**	9.64	**0.00**	0.00	**0.00**	0.50	**4.82**	0.00	**0.00**	4.82
					Wet Prairies	43.648	**0.0**	73.0	**0.071**	12.74	**0.00**	0.00	**0.00**	0.50	**6.37**	1.00	**6.37**	0.00
					Wetlands	7.205	**0.0**	77.0	**0.092**	2.74	**0.00**	0.00	**0.00**	0.50	**1.37**	1.00	**1.37**	0.00
	HD 05-05e	Swale	**Wet Pond**	0	**Transportation**	1.669	**0.0**	66.2	**0.046**	0.32	**0.20**	0.20	**0.11**	0.00	**0.00**	0.00	**0.00**	0.20
		Wet Pond	**None**	0	**Citrus Groves**	9.050	**0.0**	51.9	**0.018**	0.67	**0.20**	0.00	**0.13**	0.00	**0.00**	0.00	**0.00**	0.53
					LDR	0.353	**0.0**	82.7	**0.137**	0.20	**0.20**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.16
					Pasture	1.993	**0.0**	84.0	**0.150**	1.24	**0.20**	0.00	**0.25**	0.00	**0.00**	0.00	**0.00**	0.99
	HD 05-05f	None	**None**	1	**Nurseries**	5.349	**0.0**	82.5	**0.136**	3.01	**0.00**	0.00	**0.00**	0.10	**0.30**	0.00	**0.00**	2.71
					Upland Mixed	0.115	**0.0**	77.0	**0.092**	0.04	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					Wetlands	1.947	**0.0**	77.0	**0.092**	0.74	**0.00**	0.00	**0.00**	0.10	**0.07**	1.00	**0.67**	0.00
	HD 05-05g	None	**None**	3	**Citrus Groves**	43.029	**0.0**	46.8	**0.012**	2.17	**0.00**	0.00	**0.00**	0.50	**1.09**	0.00	**0.00**	1.09

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 05-05g**	None	**None**	3	**LDR**	43.930	**0.0**	53.5	**0.020**	3.63	**0.00**	0.00	**0.00**	0.50	**1.82**	0.00	**0.00**	1.82
					Pasture	9.463	**0.0**	57.8	**0.027**	1.04	**0.00**	0.00	**0.00**	0.50	**0.52**	0.00	**0.00**	0.52
					Pine Flatwoods	25.664	**0.0**	37.1	**0.005**	0.56	**0.00**	0.00	**0.00**	0.50	**0.28**	0.00	**0.00**	0.28
					Transportation	3.532	**0.0**	57.1	**0.025**	0.37	**0.00**	0.00	**0.00**	0.50	**0.19**	0.00	**0.00**	0.19
					Upland Hardwood	4.554	**0.0**	58.1	**0.027**	0.51	**0.00**	0.00	**0.00**	0.50	**0.26**	0.00	**0.00**	0.26
					Upland Mixed	5.024	**0.0**	57.3	**0.026**	0.54	**0.00**	0.00	**0.00**	0.50	**0.27**	0.00	**0.00**	0.27
					Upland Nonforested	37.545	**0.0**	46.5	**0.012**	1.86	**0.00**	0.00	**0.00**	0.50	**0.93**	0.00	**0.00**	0.93
					Utilities	1.868	**0.0**	82.0	**0.130**	1.01	**0.00**	0.00	**0.00**	0.50	**0.50**	0.00	**0.00**	0.50
					Wet Prairies	15.241	**0.0**	73.0	**0.071**	4.45	**0.00**	0.00	**0.00**	0.50	**2.22**	1.00	**2.22**	0.00
					Wetlands	0.349	**0.0**	77.0	**0.092**	0.13	**0.00**	0.00	**0.00**	0.50	**0.07**	1.00	**0.07**	0.00
	HD 05-05h	None	**None**	1	**Citrus Groves**	9.029	**0.0**	43.0	**0.009**	0.34	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.30
					LDR	17.700	**0.0**	50.2	**0.016**	1.15	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	1.03
					Pasture	4.453	**0.0**	49.0	**0.014**	0.27	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.24
					Transportation	2.312	**0.0**	57.1	**0.025**	0.24	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.22
					Upland Hardwood	10.992	**0.0**	31.0	**0.003**	0.12	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.11
					Upland Mixed	5.310	**0.0**	66.8	**0.048**	1.04	**0.00**	0.00	**0.00**	0.10	**0.10**	0.00	**0.00**	0.94
					Upland Nonforested	6.464	**0.0**	62.1	**0.035**	0.94	**0.00**	0.00	**0.00**	0.10	**0.09**	0.00	**0.00**	0.85
					Wetlands	13.623	**0.0**	77.0	**0.092**	5.18	**0.00**	0.00	**0.00**	0.10	**0.52**	1.00	**4.66**	0.00
	HD 05-05i	None	**None**	2	**Citrus Groves**	33.306	**0.0**	43.0	**0.009**	1.24	**0.00**	0.00	**0.00**	0.25	**0.31**	0.00	**0.00**	0.93
					Commercial	32.797	**21.4**	64.7	**0.206**	27.94	**0.00**	0.00	**0.00**	0.25	**6.98**	0.00	**0.00**	20.95
					Industrial	0.876	**0.0**	82.0	**0.131**	0.47	**0.00**	0.00	**0.00**	0.25	**0.12**	0.00	**0.00**	0.36
					Institutional	9.618	**10.4**	74.4	**0.153**	6.09	**0.00**	0.00	**0.00**	0.25	**1.52**	0.00	**0.00**	4.57
					LDR	15.580	**0.0**	50.2	**0.016**	1.01	**0.00**	0.00	**0.00**	0.25	**0.25**	0.00	**0.00**	0.76
					MDR	178.889	**0.1**	50.3	**0.016**	12.12	**0.00**	0.00	**0.00**	0.25	**3.03**	0.00	**0.00**	9.09
					Mobile Homes	4.185	**0.0**	49.6	**0.015**	0.26	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.19
					Multi-Family	0.238	**0.5**	45.8	**0.015**	0.01	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.01
					Pasture	16.006	**0.0**	55.7	**0.023**	1.53	**0.00**	0.00	**0.00**	0.25	**0.38**	0.00	**0.00**	1.15
					Recreational	2.004	**0.0**	66.2	**0.046**	0.38	**0.00**	0.00	**0.00**	0.25	**0.09**	0.00	**0.00**	0.28
					Transportation	62.299	**23.5**	54.4	**0.206**	53.15	**0.00**	0.00	**0.00**	0.25	**13.29**	0.00	**0.00**	39.87
					Upland Hardwood	13.741	**0.0**	40.4	**0.007**	0.40	**0.00**	0.00	**0.00**	0.25	**0.10**	0.00	**0.00**	0.30
					Upland Mixed	12.930	**0.0**	35.1	**0.004**	0.22	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.17
					Upland Nonforested	17.413	**0.0**	61.1	**0.033**	2.39	**0.00**	0.00	**0.00**	0.25	**0.60**	0.00	**0.00**	1.79
					Wetlands	37.917	**0.0**	77.0	**0.092**	14.42	**0.00**	0.00	**0.00**	0.25	**3.60**	1.00	**10.81**	0.00
		Wet Pond	**None**	2	**Commercial**	0.413	**22.5**	90.3	**0.378**	0.65	**0.20**	0.00	**0.13**	0.25	**0.13**	0.00	**0.00**	0.39
	HD 05-05j	None	**None**	2	**Upland Mixed**	12.642	**0.0**	42.2	**0.008**	0.44	**0.00**	0.00	**0.00**	0.25	**0.11**	0.00	**0.00**	0.33
					Wet Prairies	7.779	**0.0**	73.0	**0.071**	2.27	**0.00**	0.00	**0.00**	0.25	**0.57**	1.00	**1.70**	0.00
					Wetlands	0.663	**0.0**	77.0	**0.092**	0.25	**0.00**	0.00	**0.00**	0.25	**0.06**	1.00	**0.19**	0.00
	HD 05-05k	None	**None**	1	**MDR**	0.373	**0.0**	51.3	**0.017**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					Upland Mixed	1.830	**0.0**	51.8	**0.018**	0.13	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.12
	HD 05-05l	None	**None**	2	**LDR**	0.341	**0.0**	51.3	**0.017**	0.02	**0.00**	0.00	**0.00**	0.25	**0.01**	0.00	**0.00**	0.02
					Upland Nonforested	4.848	**0.0**	58.6	**0.028**	0.56	**0.00**	0.00	**0.00**	0.25	**0.14**	0.00	**0.00**	0.42
					Wet Prairies	1.511	**0.0**	73.0	**0.071**	0.44	**0.00**	0.00	**0.00**	0.25	**0.11**	1.00	**0.33**	0.00
	HD 05-06a	None	**None**	1	**LDR**	6.993	**0.0**	78.7	**0.103**	2.98	**0.00**	0.00	**0.00**	0.10	**0.30**	0.00	**0.00**	2.68
					Pasture	13.210	**0.0**	76.6	**0.089**	4.89	**0.00**	0.00	**0.00**	0.10	**0.49**	0.00	**0.00**	4.40
					Pine Flatwoods	0.495	**0.0**	77.0	**0.092**	0.19	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.17
					Upland Mixed	18.710	**0.0**	67.2	**0.049**	3.78	**0.00**	0.00	**0.00**	0.10	**0.38**	0.00	**0.00**	3.40
					Wet Prairies	12.134	**0.0**	73.0	**0.071**	3.54	**0.00**	0.00	**0.00**	0.10	**0.35**	1.00	**3.19**	0.00
	HD 05-06b	None	**None**	3	**Citrus Groves**	1.035	**0.0**	65.0	**0.042**	0.18	**0.00**	0.00	**0.00**	0.50	**0.09**	0.00	**0.00**	0.09
					LDR	1.191	**0.0**	79.0	**0.105**	0.52	**0.00**	0.00	**0.00**	0.50	**0.26**	0.00	**0.00**	0.26
					Pasture	7.947	**0.0**	80.7	**0.118**	3.89	**0.00**	0.00	**0.00**	0.50	**1.94**	0.00	**0.00**	1.94
					Pine Flatwoods	2.792	**0.0**	72.4	**0.068**	0.78	**0.00**	0.00	**0.00**	0.50	**0.39**	0.00	**0.00**	0.39
					Upland Mixed	5.921	**0.0**	71.4	**0.064**	1.56	**0.00**	0.00	**0.00**	0.50	**0.78**	0.00	**0.00**	0.78
					Upland Nonforested	1.300	**0.0**	76.3	**0.087**	0.47	**0.00**	0.00	**0.00**	0.50	**0.24**	0.00	**0.00**	0.24
					Wet Prairies	3.546	**0.0**	73.0	**0.071**	1.03	**0.00**	0.00	**0.00**	0.50	**0.52**	1.00	**0.52**	0.00
	HD 05-06c	None	**None**	4	**LDR**	10.456	**0.0**	70.9	**0.061**	2.65	**0.00**	0.00	**0.00**	0.65	**1.72**	0.00	**0.00**	0.93
					MDR	0.230	**0.0**	71.1	**0.062**	0.06	**0.00**	0.00	**0.00**	0.65	**0.04**	0.00	**0.00**	0.02

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 05-06c**	None	**None**	4	**Upland Mixed**	5.756	**0.0**	71.6	**0.064**	1.53	**0.00**	0.00	**0.00**	0.65	**1.00**	0.00	**0.00**	0.54
					Upland Nonforested	9.962	**0.0**	80.9	**0.120**	4.94	**0.00**	0.00	**0.00**	0.65	**3.21**	0.00	**0.00**	1.73
					Wet Prairies	5.602	**0.0**	73.0	**0.071**	1.64	**0.00**	0.00	**0.00**	0.65	**1.06**	1.00	**0.57**	0.00
	HD 05-06d	None	**None**	2	**Citrus Groves**	1.591	**0.0**	48.7	**0.014**	0.09	**0.00**	0.00	**0.00**	0.25	**0.02**	0.00	**0.00**	0.07
					Industrial	2.327	**0.0**	61.1	**0.033**	0.32	**0.00**	0.00	**0.00**	0.25	**0.08**	0.00	**0.00**	0.24
					LDR	1.447	**0.0**	66.6	**0.047**	0.28	**0.00**	0.00	**0.00**	0.25	**0.07**	0.00	**0.00**	0.21
					Pasture	8.343	**0.0**	75.4	**0.082**	2.82	**0.00**	0.00	**0.00**	0.25	**0.70**	0.00	**0.00**	2.11
					Pine Flatwoods	0.914	**0.0**	30.0	**0.002**	0.01	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.01
					Transportation	1.294	**0.0**	69.1	**0.055**	0.29	**0.00**	0.00	**0.00**	0.25	**0.07**	0.00	**0.00**	0.22
					Upland Hardwood	12.315	**0.0**	64.5	**0.041**	2.08	**0.00**	0.00	**0.00**	0.25	**0.52**	0.00	**0.00**	1.56
					Wetlands	14.354	**0.0**	77.0	**0.092**	5.46	**0.00**	0.00	**0.00**	0.25	**1.36**	1.00	**4.09**	0.00
	HD 05-06e	None	**None**	14	**Citrus Groves**	2.304	**0.0**	43.0	**0.009**	0.09	**0.00**	0.00	**0.00**	1.00	**0.09**	0.00	**0.00**	0.00
					Nurseries	4.796	**0.0**	57.0	**0.025**	0.50	**0.00**	0.00	**0.00**	1.00	**0.50**	0.00	**0.00**	0.00
					Pasture	6.505	**0.0**	49.0	**0.014**	0.39	**0.00**	0.00	**0.00**	1.00	**0.39**	0.00	**0.00**	0.00
					Pine Flatwoods	11.124	**0.0**	30.0	**0.002**	0.11	**0.00**	0.00	**0.00**	1.00	**0.11**	0.00	**0.00**	0.00
					Transportation	1.967	**0.0**	57.1	**0.025**	0.21	**0.00**	0.00	**0.00**	1.00	**0.21**	0.00	**0.00**	0.00
	HD 05-06f	None	**None**	4	**Citrus Groves**	8.514	**0.0**	43.0	**0.009**	0.32	**0.00**	0.00	**0.00**	0.65	**0.21**	0.00	**0.00**	0.11
					LDR	47.466	**0.0**	47.1	**0.013**	2.46	**0.00**	0.00	**0.00**	0.65	**1.60**	0.00	**0.00**	0.86
					Pasture	28.675	**0.0**	49.0	**0.014**	1.71	**0.00**	0.00	**0.00**	0.65	**1.11**	0.00	**0.00**	0.60
					Upland Hardwood	21.445	**0.0**	30.1	**0.002**	0.21	**0.00**	0.00	**0.00**	0.65	**0.14**	0.00	**0.00**	0.07
					Upland Mixed	1.859	**0.0**	44.7	**0.010**	0.08	**0.00**	0.00	**0.00**	0.65	**0.05**	0.00	**0.00**	0.03
					Upland Nonforested	14.632	**0.0**	43.0	**0.009**	0.54	**0.00**	0.00	**0.00**	0.65	**0.35**	0.00	**0.00**	0.19
		Swale	**None**	4	**Citrus Groves**	1.101	**0.0**	43.0	**0.009**	0.04	**0.20**	0.00	**0.01**	0.65	**0.02**	0.00	**0.00**	0.01
					LDR	8.437	**0.0**	50.0	**0.015**	0.54	**0.20**	0.00	**0.11**	0.65	**0.28**	0.00	**0.00**	0.15
					Pasture	4.840	**0.0**	49.0	**0.014**	0.29	**0.20**	0.00	**0.06**	0.65	**0.15**	0.00	**0.00**	0.08
					Transportation	4.115	**0.0**	57.1	**0.025**	0.43	**0.20**	0.00	**0.09**	0.65	**0.22**	0.00	**0.00**	0.12
					Upland Hardwood	7.539	**0.0**	30.0	**0.002**	0.07	**0.20**	0.00	**0.01**	0.65	**0.04**	0.00	**0.00**	0.02
					Upland Mixed	0.754	**0.0**	30.0	**0.002**	0.01	**0.20**	0.00	**0.00**	0.65	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	4.665	**0.0**	43.0	**0.009**	0.17	**0.20**	0.00	**0.03**	0.65	**0.09**	0.00	**0.00**	0.05
	HD 05-06h	None	**None**	1	**Citrus Groves**	5.875	**0.0**	43.2	**0.009**	0.22	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.20
					LDR	7.180	**0.0**	50.3	**0.016**	0.47	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.42
					Pasture	4.087	**0.0**	54.1	**0.021**	0.35	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.31
					Transportation	1.949	**0.0**	57.1	**0.025**	0.20	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.18
					Upland Mixed	1.301	**0.0**	77.0	**0.092**	0.49	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.45
					Wetlands	13.371	**0.0**	77.0	**0.092**	5.08	**0.00**	0.00	**0.00**	0.10	**0.51**	1.00	**4.58**	0.00
	HD 05-06i	None	**None**	4	**Citrus Groves**	8.771	**0.0**	43.1	**0.009**	0.33	**0.00**	0.00	**0.00**	0.65	**0.21**	0.00	**0.00**	0.11
					LDR	1.661	**0.0**	57.7	**0.027**	0.18	**0.00**	0.00	**0.00**	0.65	**0.12**	0.00	**0.00**	0.06
					MDR	6.391	**0.0**	51.8	**0.018**	0.47	**0.00**	0.00	**0.00**	0.65	**0.30**	0.00	**0.00**	0.16
					Nurseries	7.751	**0.0**	82.0	**0.130**	4.18	**0.00**	0.00	**0.00**	0.65	**2.72**	0.00	**0.00**	1.46
					Transportation	1.564	**0.0**	75.5	**0.082**	0.53	**0.00**	0.00	**0.00**	0.65	**0.35**	0.00	**0.00**	0.19
					Upland Mixed	55.160	**0.0**	53.5	**0.020**	4.56	**0.00**	0.00	**0.00**	0.65	**2.96**	0.00	**0.00**	1.60
					Wet Prairies	13.042	**0.0**	73.0	**0.071**	3.81	**0.00**	0.00	**0.00**	0.65	**2.47**	1.00	**1.33**	0.00
					Wetlands	48.824	**0.0**	77.0	**0.092**	18.57	**0.00**	0.00	**0.00**	0.65	**12.07**	1.00	**6.50**	0.00
		Swale	**None**	4	**LDR**	8.488	**0.0**	71.2	**0.063**	2.20	**0.20**	0.00	**0.44**	0.65	**1.14**	0.00	**0.00**	0.61
					MDR	0.944	**0.0**	67.6	**0.050**	0.20	**0.20**	0.00	**0.04**	0.65	**0.10**	0.00	**0.00**	0.05
					Transportation	2.575	**0.0**	71.5	**0.064**	0.68	**0.20**	0.00	**0.14**	0.65	**0.36**	0.00	**0.00**	0.19
					Upland Mixed	9.587	**0.0**	65.7	**0.044**	1.75	**0.20**	0.00	**0.35**	0.65	**0.91**	0.00	**0.00**	0.49
					Upland Nonforested	3.000	**0.0**	76.7	**0.090**	1.12	**0.20**	0.00	**0.22**	0.65	**0.58**	0.00	**0.00**	0.31
					Wetlands	0.637	**0.0**	77.0	**0.092**	0.24	**0.20**	0.00	**0.05**	0.65	**0.13**	1.00	**0.07**	0.00
	HD 05-06j	Dry Pond	**None**	1	**MDR**	0.709	**0.0**	53.8	**0.020**	0.06	**0.80**	0.00	**0.05**	0.10	**0.00**	0.00	**0.00**	0.01
					Mobile Homes	8.047	**19.3**	53.2	**0.172**	5.73	**0.80**	0.00	**4.58**	0.10	**0.11**	0.00	**0.00**	1.03
		None	**None**	1	**Commercial**	0.041	**13.9**	67.6	**0.155**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					LDR	5.221	**0.0**	58.7	**0.028**	0.61	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.55
					MDR	25.578	**0.0**	48.5	**0.014**	1.47	**0.00**	0.00	**0.00**	0.10	**0.15**	0.00	**0.00**	1.33
					Multi-Family	2.032	**0.0**	64.8	**0.041**	0.35	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.31
					Pasture	7.266	**0.0**	65.6	**0.044**	1.31	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.18

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 05-06j**	None	**None**	1	**Transportation**	0.138	**7.1**	55.1	**0.078**	0.04	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					Upland Nonforested	10.396	**0.0**	69.7	**0.057**	2.43	**0.00**	0.00	**0.00**	0.10	**0.24**	0.00	**0.00**	2.19
					Wetlands	4.173	**0.0**	77.0	**0.092**	1.59	**0.00**	0.00	**0.00**	0.10	**0.16**	1.00	**1.43**	0.00
	HD 05-06k	None	**None**	1	**LDR**	6.215	**0.0**	49.5	**0.015**	0.38	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.34
					MDR	3.154	**0.0**	53.6	**0.020**	0.26	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.24
					Transportation	0.242	**0.0**	61.2	**0.033**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.03
					Upland Mixed	1.686	**0.0**	51.7	**0.018**	0.12	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.11
					Upland Nonforested	4.885	**0.0**	43.1	**0.009**	0.18	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.16
					Wetlands	7.371	**0.0**	77.0	**0.092**	2.80	**0.00**	0.00	**0.00**	0.10	**0.28**	1.00	**2.52**	0.00
	HD 05-06l	None	**None**	1	**Citrus Groves**	2.741	**0.0**	43.0	**0.009**	0.10	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.09
					Industrial	4.870	**0.0**	56.9	**0.025**	0.51	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.45
					Institutional	4.173	**0.5**	39.2	**0.010**	0.18	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.16
					Multi-Family	0.803	**18.2**	52.1	**0.162**	0.54	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.48
					Recreational	0.658	**0.0**	40.2	**0.007**	0.02	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					Transportation	0.536	**14.0**	82.2	**0.227**	0.50	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.45
					Upland Nonforested	1.281	**0.0**	43.0	**0.009**	0.05	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
	HD 05-06m	Dry Pond	**None**	0	**Commercial**	7.310	**16.8**	74.5	**0.200**	6.06	**0.80**	0.00	**4.85**	0.00	**0.00**	0.00	**0.00**	1.21
					Industrial	0.014	**0.0**	39.0	**0.006**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Institutional	6.275	**30.3**	56.1	**0.262**	6.80	**0.80**	0.00	**5.44**	0.00	**0.00**	0.00	**0.00**	1.36
					LDR	1.125	**0.0**	51.3	**0.017**	0.08	**0.80**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.02
					MDR	0.162	**12.5**	47.4	**0.112**	0.08	**0.80**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.02
					Multi-Family	4.417	**25.1**	58.8	**0.224**	4.10	**0.80**	0.00	**3.28**	0.00	**0.00**	0.00	**0.00**	0.82
					Pine Flatwoods	1.914	**0.0**	30.0	**0.002**	0.02	**0.80**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.00
					Recreational	0.076	**0.0**	39.0	**0.006**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Transportation	0.657	**40.9**	58.4	**0.347**	0.94	**0.80**	0.00	**0.76**	0.00	**0.00**	0.00	**0.00**	0.19
					Upland Nonforested	1.126	**0.0**	43.0	**0.009**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
	HD 05-06n	None	**None**	3	**Citrus Groves**	0.478	**0.0**	43.0	**0.009**	0.02	**0.00**	0.00	**0.00**	0.50	**0.01**	0.00	**0.00**	0.01
					Industrial	0.455	**0.0**	70.1	**0.058**	0.11	**0.00**	0.00	**0.00**	0.50	**0.05**	0.00	**0.00**	0.05
					Institutional	0.000	**60.0**	98.0	**0.723**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					LDR	4.678	**0.0**	51.3	**0.017**	0.33	**0.00**	0.00	**0.00**	0.50	**0.16**	0.00	**0.00**	0.16
					Pasture	0.957	**0.0**	49.0	**0.014**	0.06	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					Pine Flatwoods	0.045	**0.0**	30.0	**0.002**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					Recreational	5.054	**0.0**	41.4	**0.008**	0.16	**0.00**	0.00	**0.00**	0.50	**0.08**	0.00	**0.00**	0.08
					Upland Nonforested	2.064	**0.0**	43.0	**0.009**	0.08	**0.00**	0.00	**0.00**	0.50	**0.04**	0.00	**0.00**	0.04
	HD 05-06o	Dry Pond	**None**	0	**Institutional**	20.713	**30.1**	56.0	**0.260**	22.31	**0.80**	0.00	**17.85**	0.00	**0.00**	0.00	**0.00**	4.46
					MDR	0.094	**8.0**	59.5	**0.092**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
	HD 05-06p	Wet Pond	**None**	0	**Commercial**	1.119	**29.8**	64.0	**0.269**	1.25	**0.20**	0.00	**0.25**	0.00	**0.00**	0.00	**0.00**	1.00
	HD 05-06q	None	**None**	4	**Citrus Groves**	3.999	**0.0**	43.0	**0.009**	0.15	**0.00**	0.00	**0.00**	0.65	**0.10**	0.00	**0.00**	0.05
					Commercial	0.700	**0.0**	79.8	**0.110**	0.32	**0.00**	0.00	**0.00**	0.65	**0.21**	0.00	**0.00**	0.11
					Industrial	5.268	**0.0**	62.4	**0.036**	0.78	**0.00**	0.00	**0.00**	0.65	**0.51**	0.00	**0.00**	0.27
					Transportation	0.577	**0.0**	65.4	**0.043**	0.10	**0.00**	0.00	**0.00**	0.65	**0.07**	0.00	**0.00**	0.04
	HD 05-07a	None	**None**	1	**Citrus Groves**	1.788	**0.0**	44.5	**0.010**	0.07	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.07
					LDR	3.478	**0.0**	76.4	**0.088**	1.27	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.14
					Pasture	0.001	**0.0**	49.0	**0.014**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	17.676	**0.0**	72.4	**0.068**	4.97	**0.00**	0.00	**0.00**	0.10	**0.50**	0.00	**0.00**	4.47
					Wet Prairies	0.037	**0.0**	73.0	**0.071**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	1.00	**0.01**	0.00
	HD 05-07b	None	**None**	2	**LDR**	1.231	**0.0**	81.1	**0.121**	0.62	**0.00**	0.00	**0.00**	0.25	**0.15**	0.00	**0.00**	0.46
					Pasture	17.420	**0.0**	81.8	**0.128**	9.26	**0.00**	0.00	**0.00**	0.25	**2.32**	0.00	**0.00**	6.95
					Upland Mixed	13.074	**0.0**	73.7	**0.073**	3.98	**0.00**	0.00	**0.00**	0.25	**0.99**	0.00	**0.00**	2.98
	HD 05-07e	None	**None**	4	**Citrus Groves**	1.514	**0.0**	43.0	**0.009**	0.06	**0.00**	0.00	**0.00**	0.65	**0.04**	0.00	**0.00**	0.02
					LDR	2.131	**0.0**	69.5	**0.056**	0.49	**0.00**	0.00	**0.00**	0.65	**0.32**	0.00	**0.00**	0.17
					Pasture	0.018	**0.0**	49.0	**0.014**	0.00	**0.00**	0.00	**0.00**	0.65	**0.00**	0.00	**0.00**	0.00
					Transportation	1.126	**0.0**	72.8	**0.070**	0.32	**0.00**	0.00	**0.00**	0.65	**0.21**	0.00	**0.00**	0.11
					Upland Mixed	4.760	**0.0**	58.1	**0.027**	0.54	**0.00**	0.00	**0.00**	0.65	**0.35**	0.00	**0.00**	0.19
	HD 05-07f	None	**None**	1	**Commercial**	1.741	**2.0**	65.0	**0.057**	0.41	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.37
					Institutional	0.485	**0.0**	75.4	**0.082**	0.16	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 05-07f**	None	**None**	1	**LDR**	4.329	**0.0**	80.3	**0.114**	2.04	**0.00**	0.00	**0.00**	0.10	**0.20**	0.00	**0.00**	1.84
					MDR	11.604	**0.0**	61.0	**0.033**	1.58	**0.00**	0.00	**0.00**	0.10	**0.16**	0.00	**0.00**	1.42
					Recreational	0.566	**0.0**	46.0	**0.011**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					Transportation	1.156	**0.3**	79.5	**0.110**	0.53	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.47
					Upland Mixed	3.019	**0.0**	63.5	**0.038**	0.48	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.43
					Upland Nonforested	7.004	**0.0**	82.0	**0.130**	3.78	**0.00**	0.00	**0.00**	0.10	**0.38**	0.00	**0.00**	3.40
		Swale	**None**	1	**Commercial**	1.417	**0.0**	68.1	**0.052**	0.30	**0.20**	0.00	**0.06**	0.10	**0.02**	0.00	**0.00**	0.22
					LDR	0.337	**0.0**	81.8	**0.128**	0.18	**0.20**	0.00	**0.04**	0.10	**0.01**	0.00	**0.00**	0.13
					MDR	1.435	**0.0**	67.2	**0.049**	0.29	**0.20**	0.00	**0.06**	0.10	**0.02**	0.00	**0.00**	0.21
					Transportation	2.877	**0.0**	75.1	**0.080**	0.95	**0.20**	0.00	**0.19**	0.10	**0.08**	0.00	**0.00**	0.69
					Upland Mixed	1.512	**0.0**	77.0	**0.092**	0.57	**0.20**	0.00	**0.11**	0.10	**0.05**	0.00	**0.00**	0.41
	HD 05-07g	Dry Pond	**None**	1	**Mobile Homes**	14.107	**23.4**	57.7	**0.210**	12.27	**0.80**	0.00	**9.81**	0.10	**0.25**	0.00	**0.00**	2.21
		None	**None**	1	**Citrus Groves**	1.082	**0.0**	43.0	**0.009**	0.04	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					LDR	12.600	**0.0**	66.2	**0.046**	2.37	**0.00**	0.00	**0.00**	0.10	**0.24**	0.00	**0.00**	2.14
					MDR	0.458	**0.0**	62.6	**0.036**	0.07	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.06
					Mobile Homes	2.422	**0.0**	56.8	**0.025**	0.25	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.23
					Recreational	4.278	**0.0**	42.8	**0.009**	0.16	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.14
					Transportation	0.859	**0.0**	65.6	**0.044**	0.16	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.14
					Upland Mixed	0.923	**0.0**	35.0	**0.004**	0.02	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
					Upland Nonforested	16.151	**0.0**	74.7	**0.078**	5.20	**0.00**	0.00	**0.00**	0.10	**0.52**	0.00	**0.00**	4.68
					Wetlands	2.464	**0.0**	77.0	**0.092**	0.94	**0.00**	0.00	**0.00**	0.10	**0.09**	1.00	**0.84**	0.00
	HD 05-07h	None	**None**	6	**Institutional**	3.027	**0.0**	65.8	**0.044**	0.55	**0.00**	0.00	**0.00**	0.90	**0.50**	0.00	**0.00**	0.06
					LDR	1.439	**0.0**	78.4	**0.100**	0.60	**0.00**	0.00	**0.00**	0.90	**0.54**	0.00	**0.00**	0.06
					MDR	34.529	**0.0**	51.6	**0.018**	2.54	**0.00**	0.00	**0.00**	0.90	**2.29**	0.00	**0.00**	0.25
					Pasture	0.445	**0.0**	49.5	**0.015**	0.03	**0.00**	0.00	**0.00**	0.90	**0.02**	0.00	**0.00**	0.00
					Transportation	1.091	**49.9**	47.9	**0.411**	1.85	**0.00**	0.00	**0.00**	0.90	**1.67**	0.00	**0.00**	0.19
					Upland Mixed	0.146	**0.0**	30.0	**0.002**	0.00	**0.00**	0.00	**0.00**	0.90	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	3.020	**0.0**	75.7	**0.084**	1.05	**0.00**	0.00	**0.00**	0.90	**0.94**	0.00	**0.00**	0.10
		Wet Pond	**None**	6	**Commercial**	11.477	**13.7**	67.1	**0.153**	7.25	**0.20**	0.00	**1.45**	0.90	**5.22**	0.00	**0.00**	0.58
					Institutional	0.027	**0.0**	87.7	**0.205**	0.02	**0.20**	0.00	**0.00**	0.90	**0.02**	0.00	**0.00**	0.00
					MDR	0.671	**0.0**	44.2	**0.010**	0.03	**0.20**	0.00	**0.01**	0.90	**0.02**	0.00	**0.00**	0.00
	HD 05-07i	Wet Pond	**None**	0	**Citrus Groves**	9.963	**0.0**	43.0	**0.009**	0.37	**0.20**	0.00	**0.07**	0.00	**0.00**	0.00	**0.00**	0.30
					LDR	11.980	**0.0**	46.1	**0.011**	0.57	**0.20**	0.00	**0.11**	0.00	**0.00**	0.00	**0.00**	0.46
					MDR	13.259	**0.0**	49.2	**0.015**	0.80	**0.20**	0.00	**0.16**	0.00	**0.00**	0.00	**0.00**	0.64
					Transportation	1.841	**0.0**	62.0	**0.035**	0.27	**0.20**	0.00	**0.05**	0.00	**0.00**	0.00	**0.00**	0.21
					Upland Mixed	0.304	**0.0**	58.9	**0.028**	0.04	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.03
					Upland Nonforested	2.117	**0.0**	53.7	**0.020**	0.18	**0.20**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.14
	HD 05-07j	Dry Pond	**None**	0	**Institutional**	0.078	**36.3**	61.4	**0.315**	0.10	**0.80**	0.00	**0.08**	0.00	**0.00**	0.00	**0.00**	0.02
					Pine Flatwoods	0.312	**0.0**	30.0	**0.002**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Recreational	1.439	**0.0**	39.5	**0.006**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
	HD 05-07k	Dry Pond	**None**	0	**Multi-Family**	3.078	**29.8**	64.1	**0.269**	3.43	**0.80**	0.00	**2.74**	0.00	**0.00**	0.00	**0.00**	0.69
		None	**None**	0	**Transportation**	0.065	**0.0**	67.7	**0.050**	0.01	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
	HD 05-07l	None	**None**	1	**Pasture**	0.044	**0.0**	84.0	**0.150**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					Upland Mixed	0.928	**0.0**	77.0	**0.092**	0.35	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.32
					Wet Prairies	3.439	**0.0**	73.0	**0.071**	1.00	**0.00**	0.00	**0.00**	0.10	**0.10**	1.00	**0.90**	0.00
	HD 05-08a	None	**None**	2	**Citrus Groves**	0.710	**0.0**	43.0	**0.009**	0.03	**0.00**	0.00	**0.00**	0.25	**0.01**	0.00	**0.00**	0.02
					LDR	2.274	**0.0**	59.2	**0.029**	0.27	**0.00**	0.00	**0.00**	0.25	**0.07**	0.00	**0.00**	0.21
					Pasture	11.826	**0.0**	50.9	**0.016**	0.81	**0.00**	0.00	**0.00**	0.25	**0.20**	0.00	**0.00**	0.61
					Upland Mixed	2.805	**0.0**	52.4	**0.019**	0.22	**0.00**	0.00	**0.00**	0.25	**0.05**	0.00	**0.00**	0.16
	HD 05-08b	None	**None**	1	**LDR**	4.148	**0.0**	74.4	**0.077**	1.32	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.18
					Pasture	29.400	**0.0**	81.1	**0.122**	14.84	**0.00**	0.00	**0.00**	0.10	**1.48**	0.00	**0.00**	13.35
					Upland Mixed	0.347	**0.0**	52.3	**0.018**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
	HD 05-08e	None	**None**	3	**Citrus Groves**	0.001	**0.0**	43.0	**0.009**	0.00	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					LDR	18.063	**0.0**	78.4	**0.101**	7.52	**0.00**	0.00	**0.00**	0.50	**3.76**	0.00	**0.00**	3.76
					Pasture	4.250	**0.0**	55.6	**0.023**	0.40	**0.00**	0.00	**0.00**	0.50	**0.20**	0.00	**0.00**	0.20
					Transportation	0.796	**0.0**	79.5	**0.108**	0.35	**0.00**	0.00	**0.00**	0.50	**0.18**	0.00	**0.00**	0.18

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 05-08e**	None	**None**	3	**Upland Mixed**	11.605	**0.0**	66.3	**0.046**	2.20	**0.00**	0.00	**0.00**	0.50	**1.10**	0.00	**0.00**	1.10
					Upland Nonforested	4.520	**0.0**	78.5	**0.101**	1.89	**0.00**	0.00	**0.00**	0.50	**0.95**	0.00	**0.00**	0.95
					Utilities	0.300	**0.0**	82.6	**0.136**	0.17	**0.00**	0.00	**0.00**	0.50	**0.08**	0.00	**0.00**	0.08
					Wetlands	0.556	**0.0**	77.0	**0.092**	0.21	**0.00**	0.00	**0.00**	0.50	**0.11**	1.00	**0.11**	0.00
		Swale	**None**	3	**Transportation**	2.755	**0.0**	74.0	**0.075**	0.85	**0.20**	0.00	**0.17**	0.50	**0.34**	0.00	**0.00**	0.34
	HD 05-08f	None	**None**	3	**Citrus Groves**	11.080	**0.0**	43.0	**0.009**	0.41	**0.00**	0.00	**0.00**	0.50	**0.21**	0.00	**0.00**	0.21
					LDR	18.549	**0.0**	70.5	**0.059**	4.57	**0.00**	0.00	**0.00**	0.50	**2.28**	0.00	**0.00**	2.28
					MDR	22.825	**0.0**	52.1	**0.018**	1.71	**0.00**	0.00	**0.00**	0.50	**0.85**	0.00	**0.00**	0.85
					Pasture	2.852	**0.0**	49.0	**0.014**	0.17	**0.00**	0.00	**0.00**	0.50	**0.08**	0.00	**0.00**	0.08
					Pine Flatwoods	4.455	**0.0**	45.1	**0.011**	0.19	**0.00**	0.00	**0.00**	0.50	**0.10**	0.00	**0.00**	0.10
					Transportation	4.231	**0.0**	69.5	**0.056**	0.98	**0.00**	0.00	**0.00**	0.50	**0.49**	0.00	**0.00**	0.49
					Upland Mixed	1.374	**0.0**	55.6	**0.023**	0.13	**0.00**	0.00	**0.00**	0.50	**0.06**	0.00	**0.00**	0.06
					Upland Nonforested	9.107	**0.0**	72.9	**0.070**	2.65	**0.00**	0.00	**0.00**	0.50	**1.32**	0.00	**0.00**	1.32
	HD 05-08g	None	**None**	5	**Citrus Groves**	1.549	**0.0**	43.0	**0.009**	0.06	**0.00**	0.00	**0.00**	0.80	**0.05**	0.00	**0.00**	0.01
					Commercial	8.301	**26.1**	59.9	**0.234**	8.03	**0.00**	0.00	**0.00**	0.80	**6.42**	0.00	**0.00**	1.61
					Institutional	1.515	**0.0**	59.7	**0.030**	0.19	**0.00**	0.00	**0.00**	0.80	**0.15**	0.00	**0.00**	0.04
					LDR	3.258	**0.0**	80.9	**0.120**	1.61	**0.00**	0.00	**0.00**	0.80	**1.29**	0.00	**0.00**	0.32
					MDR	75.035	**2.8**	53.1	**0.041**	12.87	**0.00**	0.00	**0.00**	0.80	**10.30**	0.00	**0.00**	2.57
					Transportation	1.356	**48.1**	48.9	**0.397**	2.23	**0.00**	0.00	**0.00**	0.80	**1.78**	0.00	**0.00**	0.45
					Upland Mixed	1.109	**0.0**	38.8	**0.006**	0.03	**0.00**	0.00	**0.00**	0.80	**0.02**	0.00	**0.00**	0.01
					Upland Nonforested	2.830	**0.0**	82.0	**0.130**	1.53	**0.00**	0.00	**0.00**	0.80	**1.22**	0.00	**0.00**	0.31
	HD 05-08i	None	**None**	5	**Citrus Groves**	14.238	**0.0**	43.0	**0.009**	0.53	**0.00**	0.00	**0.00**	0.80	**0.42**	0.00	**0.00**	0.11
					LDR	0.185	**0.0**	46.4	**0.012**	0.01	**0.00**	0.00	**0.00**	0.80	**0.01**	0.00	**0.00**	0.00
					Transportation	0.116	**0.0**	43.5	**0.009**	0.00	**0.00**	0.00	**0.00**	0.80	**0.00**	0.00	**0.00**	0.00
	HD 05-09c	None	**None**	7	**Citrus Groves**	8.807	**0.0**	43.6	**0.009**	0.34	**0.00**	0.00	**0.00**	1.00	**0.34**	0.00	**0.00**	0.00
					Institutional	0.085	**0.0**	39.0	**0.006**	0.00	**0.00**	0.00	**0.00**	1.00	**0.00**	0.00	**0.00**	0.00
					MDR	3.602	**0.0**	53.4	**0.020**	0.30	**0.00**	0.00	**0.00**	1.00	**0.30**	0.00	**0.00**	0.00
					Upland Mixed	4.728	**0.0**	77.0	**0.092**	1.80	**0.00**	0.00	**0.00**	1.00	**1.80**	0.00	**0.00**	0.00
	HD 05-09e	None	**None**	2	**Pasture**	3.085	**0.0**	49.0	**0.014**	0.18	**0.00**	0.00	**0.00**	0.25	**0.05**	0.00	**0.00**	0.14
					Upland Mixed	1.816	**0.0**	51.0	**0.017**	0.13	**0.00**	0.00	**0.00**	0.25	**0.03**	0.00	**0.00**	0.09
	HD 06-01	None	**None**	1	**Citrus Groves**	1.909	**0.0**	43.0	**0.009**	0.07	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.06
					Dairies	0.291	**0.0**	98.0	**0.595**	0.72	**0.00**	0.00	**0.00**	0.10	**0.07**	0.00	**0.00**	0.64
					LDR	11.165	**0.0**	50.3	**0.016**	0.73	**0.00**	0.00	**0.00**	0.10	**0.07**	0.00	**0.00**	0.66
					MDR	0.891	**0.0**	61.0	**0.033**	0.12	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.11
					Pasture	19.437	**0.0**	79.7	**0.109**	8.76	**0.00**	0.00	**0.00**	0.10	**0.88**	0.00	**0.00**	7.89
					Pine Flatwoods	5.388	**0.0**	77.0	**0.092**	2.05	**0.00**	0.00	**0.00**	0.10	**0.20**	0.00	**0.00**	1.84
					Transportation	0.663	**0.0**	55.3	**0.022**	0.06	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.06
					Upland Hardwood	0.005	**0.0**	77.0	**0.092**	0.00	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	19.275	**0.0**	46.5	**0.012**	0.95	**0.00**	0.00	**0.00**	0.10	**0.10**	0.00	**0.00**	0.86
					Upland Nonforested	70.820	**0.0**	53.8	**0.020**	5.94	**0.00**	0.00	**0.00**	0.10	**0.59**	0.00	**0.00**	5.35
					Wet Prairies	328.848	**0.0**	73.0	**0.071**	95.99	**0.00**	0.00	**0.00**	0.10	**9.60**	1.00	**86.39**	0.00
					Wetlands	64.837	**0.0**	77.0	**0.092**	24.65	**0.00**	0.00	**0.00**	0.10	**2.47**	1.00	**22.19**	0.00
		Swale	**None**	1	**Transportation**	5.820	**0.0**	53.8	**0.020**	0.49	**0.20**	0.00	**0.10**	0.10	**0.04**	0.00	**0.00**	0.35
	HD 06-02a	None	**None**	1	**LDR**	10.317	**0.0**	48.1	**0.013**	0.58	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.52
					MDR	2.186	**0.0**	55.9	**0.023**	0.21	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.19
					Transportation	4.469	**0.0**	56.2	**0.024**	0.44	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.40
					Upland Mixed	37.936	**0.0**	39.0	**0.006**	0.98	**0.00**	0.00	**0.00**	0.10	**0.10**	0.00	**0.00**	0.89
					Upland Nonforested	10.867	**0.0**	43.0	**0.009**	0.40	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.36
					Wetlands	1.193	**0.0**	77.0	**0.092**	0.45	**0.00**	0.00	**0.00**	0.10	**0.05**	1.00	**0.41**	0.00
	HD 06-02b	None	**None**	1	**Citrus Groves**	14.707	**0.0**	43.4	**0.009**	0.56	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.51
					LDR	3.046	**0.0**	48.5	**0.014**	0.18	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.16
					Pasture	5.863	**0.0**	49.9	**0.015**	0.37	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.33
					Pine Flatwoods	63.977	**0.0**	50.5	**0.016**	4.25	**0.00**	0.00	**0.00**	0.10	**0.42**	0.00	**0.00**	3.82
					Upland Hardwood	22.308	**0.0**	73.1	**0.071**	6.55	**0.00**	0.00	**0.00**	0.10	**0.66**	0.00	**0.00**	5.90
					Upland Mixed	2.808	**0.0**	77.0	**0.092**	1.07	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.96
					Upland Nonforested	57.603	**0.0**	67.1	**0.048**	11.56	**0.00**	0.00	**0.00**	0.10	**1.16**	0.00	**0.00**	10.40

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**HD 06-02b**	None	**None**	1	**Wet Prairies**	13.259	**0.0**	73.0	**0.071**	3.87	**0.00**	0.00	**0.00**	0.10	**0.39**	1.00	**3.48**	0.00
					Wetlands	143.955	**0.0**	77.0	**0.092**	54.74	**0.00**	0.00	**0.00**	0.10	**5.47**	1.00	**49.27**	0.00
		Swale	**None**	1	**Citrus Groves**	2.147	**0.0**	43.0	**0.009**	0.08	**0.20**	0.00	**0.02**	0.10	**0.01**	0.00	**0.00**	0.06
					Transportation	1.554	**0.0**	60.4	**0.031**	0.20	**0.20**	0.00	**0.04**	0.10	**0.02**	0.00	**0.00**	0.15
					Upland Mixed	1.052	**0.0**	30.0	**0.002**	0.01	**0.20**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
	HD 06-02c	Swale	**None**	4	**Industrial**	0.399	**0.0**	52.2	**0.018**	0.03	**0.20**	0.00	**0.01**	0.65	**0.02**	0.00	**0.00**	0.01
					Pasture	18.226	**0.0**	49.2	**0.015**	1.10	**0.20**	0.00	**0.22**	0.65	**0.57**	0.00	**0.00**	0.31
					Pine Flatwoods	1.099	**0.0**	30.0	**0.002**	0.01	**0.20**	0.00	**0.00**	0.65	**0.01**	0.00	**0.00**	0.00
					Transportation	2.518	**0.0**	55.4	**0.023**	0.23	**0.20**	0.00	**0.05**	0.65	**0.12**	0.00	**0.00**	0.07
					Upland Hardwood	13.110	**0.0**	47.8	**0.013**	0.72	**0.20**	0.00	**0.14**	0.65	**0.37**	0.00	**0.00**	0.20
	HD 06-03a	None	**None**	2	**Citrus Groves**	2.025	**0.0**	43.0	**0.009**	0.08	**0.00**	0.00	**0.00**	0.25	**0.02**	0.00	**0.00**	0.06
					LDR	10.587	**0.0**	48.2	**0.014**	0.60	**0.00**	0.00	**0.00**	0.25	**0.15**	0.00	**0.00**	0.45
					Pasture	15.674	**0.0**	54.8	**0.022**	1.40	**0.00**	0.00	**0.00**	0.25	**0.35**	0.00	**0.00**	1.05
					Transportation	4.116	**0.0**	53.8	**0.020**	0.35	**0.00**	0.00	**0.00**	0.25	**0.09**	0.00	**0.00**	0.26
					Upland Mixed	16.323	**0.0**	30.0	**0.002**	0.16	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.12
					Upland Nonforested	17.418	**0.0**	43.0	**0.009**	0.65	**0.00**	0.00	**0.00**	0.25	**0.16**	0.00	**0.00**	0.49
	HD 06-03b	None	**None**	1	**Pasture**	18.004	**0.0**	51.9	**0.018**	1.33	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.20
					Pine Flatwoods	3.097	**0.0**	69.7	**0.057**	0.72	**0.00**	0.00	**0.00**	0.10	**0.07**	0.00	**0.00**	0.65
					Transportation	1.419	**0.0**	60.7	**0.032**	0.19	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.17
					Upland Mixed	30.663	**0.0**	39.7	**0.007**	0.84	**0.00**	0.00	**0.00**	0.10	**0.08**	0.00	**0.00**	0.76
					Upland Nonforested	0.472	**0.0**	82.0	**0.130**	0.25	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.23
					Wetlands	31.085	**0.0**	77.0	**0.092**	11.82	**0.00**	0.00	**0.00**	0.10	**1.18**	1.00	**10.64**	0.00
	HD 06-03c	None	**None**	1	**Pasture**	10.933	**0.0**	49.1	**0.015**	0.66	**0.00**	0.00	**0.00**	0.10	**0.07**	0.00	**0.00**	0.59
					Upland Nonforested	9.776	**0.0**	43.2	**0.009**	0.37	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.33
					Wetlands	18.032	**0.0**	77.0	**0.092**	6.86	**0.00**	0.00	**0.00**	0.10	**0.69**	1.00	**6.17**	0.00
	HD 06-03d	Swale	**None**	4	**LDR**	33.115	**0.0**	48.3	**0.014**	1.88	**0.20**	0.00	**0.38**	0.65	**0.98**	0.00	**0.00**	0.53
					Nurseries	0.895	**0.0**	49.0	**0.014**	0.05	**0.20**	0.00	**0.01**	0.65	**0.03**	0.00	**0.00**	0.01
					Pasture	7.615	**0.0**	57.3	**0.026**	0.82	**0.20**	0.00	**0.16**	0.65	**0.42**	0.00	**0.00**	0.23
					Pine Flatwoods	6.611	**0.0**	30.0	**0.002**	0.06	**0.20**	0.00	**0.01**	0.65	**0.03**	0.00	**0.00**	0.02
					Transportation	1.440	**0.0**	56.9	**0.025**	0.15	**0.20**	0.00	**0.03**	0.65	**0.08**	0.00	**0.00**	0.04
					Upland Mixed	3.138	**0.0**	68.8	**0.054**	0.70	**0.20**	0.00	**0.14**	0.65	**0.36**	0.00	**0.00**	0.20
					Upland Nonforested	3.613	**0.0**	43.0	**0.009**	0.13	**0.20**	0.00	**0.03**	0.65	**0.07**	0.00	**0.00**	0.04
	HD 06-04a	None	**None**	3	**Pasture**	11.652	**0.0**	49.0	**0.014**	0.69	**0.00**	0.00	**0.00**	0.50	**0.35**	0.00	**0.00**	0.35
	HD 06-04b	Dry Pond	**None**	0	**MDR**	6.294	**8.4**	40.8	**0.075**	1.95	**0.80**	0.00	**1.56**	0.00	**0.00**	0.00	**0.00**	0.39
					Pasture	0.010	**0.0**	49.0	**0.014**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Wetlands	0.135	**0.0**	77.0	**0.092**	0.05	**0.80**	0.00	**0.04**	0.00	**0.00**	1.00	**0.01**	0.00
	HD 06-04c	None	**None**	18	**Transportation**	0.896	**0.0**	59.0	**0.029**	0.11	**0.00**	0.00	**0.00**	1.00	**0.11**	0.00	**0.00**	0.00
					Upland Mixed	12.617	**0.0**	30.0	**0.002**	0.12	**0.00**	0.00	**0.00**	1.00	**0.12**	0.00	**0.00**	0.00
	LS 01-01	None	**None**	3	**Citrus Groves**	2.248	**0.0**	43.0	**0.009**	0.08	**0.00**	0.00	**0.00**	0.50	**0.04**	0.00	**0.00**	0.04
					Institutional	2.646	**0.0**	39.0	**0.006**	0.07	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					LDR	15.137	**0.0**	54.2	**0.021**	1.31	**0.00**	0.00	**0.00**	0.50	**0.65**	0.00	**0.00**	0.65
					MDR	15.861	**4.7**	54.4	**0.058**	3.84	**0.00**	0.00	**0.00**	0.50	**1.92**	0.00	**0.00**	1.92
					Pasture	19.003	**0.0**	51.2	**0.017**	1.33	**0.00**	0.00	**0.00**	0.50	**0.67**	0.00	**0.00**	0.67
					Pine Flatwoods	5.910	**0.0**	30.3	**0.002**	0.06	**0.00**	0.00	**0.00**	0.50	**0.03**	0.00	**0.00**	0.03
					Shrub and Brushland	0.900	**0.0**	30.0	**0.002**	0.01	**0.00**	0.00	**0.00**	0.50	**0.00**	0.00	**0.00**	0.00
					Transportation	3.416	**0.0**	62.6	**0.036**	0.51	**0.00**	0.00	**0.00**	0.50	**0.26**	0.00	**0.00**	0.26
					Upland Mixed	16.487	**0.0**	30.6	**0.003**	0.17	**0.00**	0.00	**0.00**	0.50	**0.09**	0.00	**0.00**	0.09
					Upland Nonforested	12.493	**0.0**	43.0	**0.009**	0.46	**0.00**	0.00	**0.00**	0.50	**0.23**	0.00	**0.00**	0.23
					Wetlands	37.651	**0.0**	77.0	**0.092**	14.32	**0.00**	0.00	**0.00**	0.50	**7.16**	1.00	**7.16**	0.00
	LS 01-02a	Swale	**None**	0	**Transportation**	3.281	**0.0**	67.6	**0.050**	0.68	**0.20**	0.00	**0.14**	0.00	**0.00**	0.00	**0.00**	0.54
		Wet Pond	**None**	0	**Institutional**	0.447	**5.3**	41.2	**0.050**	0.09	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.07
					LDR	6.310	**0.0**	77.0	**0.092**	2.41	**0.20**	0.00	**0.48**	0.00	**0.00**	0.00	**0.00**	1.92
					MDR	6.265	**21.7**	63.4	**0.206**	5.34	**0.20**	0.00	**1.07**	0.00	**0.00**	0.00	**0.00**	4.27
					Pasture	6.484	**0.0**	84.0	**0.150**	4.02	**0.20**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	3.22
					Pine Flatwoods	19.141	**0.0**	62.6	**0.037**	2.89	**0.20**	0.00	**0.58**	0.00	**0.00**	0.00	**0.00**	2.31
					Transportation	0.974	**0.0**	59.0	**0.029**	0.12	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.09

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**LS 01-02a**	Wet Pond	**None**	0	**Upland Mixed**	23.549	**0.0**	54.1	**0.021**	2.02	**0.20**	0.00	**0.40**	0.00	**0.00**	0.00	**0.00**	1.62
					Wetlands	1.846	**0.0**	77.0	**0.092**	0.70	**0.20**	0.00	**0.14**	0.00	**0.00**	1.00	**0.56**	0.00
	LS 01-02b	Dry Pond	**None**	0	**Institutional**	0.063	**0.0**	39.0	**0.006**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	6.922	**22.5**	57.4	**0.202**	5.79	**0.80**	0.00	**4.63**	0.00	**0.00**	0.00	**0.00**	1.16
		Wet Pond	**None**	0	**Pine Flatwoods**	0.022	**0.0**	77.0	**0.092**	0.01	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
					Upland Mixed	2.323	**0.0**	32.0	**0.003**	0.03	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.02
					Wetlands	0.268	**0.0**	77.0	**0.092**	0.10	**0.20**	0.00	**0.02**	0.00	**0.00**	1.00	**0.08**	0.00
	LS 01-02c	Dry Pond	**None**	0	**Citrus Groves**	2.593	**0.0**	43.0	**0.009**	0.10	**0.80**	0.00	**0.08**	0.00	**0.00**	0.00	**0.00**	0.02
					MDR	35.500	**10.6**	47.3	**0.098**	14.33	**0.80**	0.00	**11.47**	0.00	**0.00**	0.00	**0.00**	2.87
					Pasture	0.026	**0.0**	49.0	**0.014**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Pine Flatwoods	0.007	**0.0**	77.0	**0.092**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Transportation	0.547	**0.0**	57.1	**0.026**	0.06	**0.80**	0.00	**0.05**	0.00	**0.00**	0.00	**0.00**	0.01
					Upland Mixed	2.173	**0.0**	30.5	**0.002**	0.02	**0.80**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	2.141	**0.0**	43.0	**0.009**	0.08	**0.80**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.02
					Wetlands	0.290	**0.0**	77.0	**0.092**	0.11	**0.80**	0.00	**0.09**	0.00	**0.00**	1.00	**0.02**	0.00
	LS 01-02d	Dry Pond	**None**	0	**Institutional**	23.551	**24.9**	52.0	**0.215**	20.94	**0.80**	0.00	**16.75**	0.00	**0.00**	0.00	**0.00**	4.19
					Transportation	0.192	**0.0**	41.0	**0.008**	0.01	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	13.254	**0.0**	30.0	**0.002**	0.13	**0.80**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.03
	LS 01-02e	Swale	**None**	1	**MDR**	12.050	**0.0**	53.8	**0.020**	1.01	**0.20**	0.00	**0.20**	0.10	**0.08**	0.00	**0.00**	0.73
					Shrub and Brushland	5.781	**0.0**	30.0	**0.002**	0.06	**0.20**	0.00	**0.01**	0.10	**0.00**	0.00	**0.00**	0.04
					Upland Mixed	17.939	**0.0**	30.0	**0.002**	0.17	**0.20**	0.00	**0.03**	0.10	**0.01**	0.00	**0.00**	0.12
	LS 01-03c	None	**None**	1	**Citrus Groves**	0.990	**0.0**	43.0	**0.009**	0.04	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.03
					LDR	9.866	**0.0**	72.1	**0.066**	2.71	**0.00**	0.00	**0.00**	0.10	**0.27**	0.00	**0.00**	2.44
					Transportation	1.070	**0.0**	59.3	**0.029**	0.13	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.12
					Upland Mixed	4.581	**0.0**	73.1	**0.071**	1.35	**0.00**	0.00	**0.00**	0.10	**0.13**	0.00	**0.00**	1.21
					Upland Nonforested	4.256	**0.0**	82.0	**0.130**	2.30	**0.00**	0.00	**0.00**	0.10	**0.23**	0.00	**0.00**	2.07
					Wetlands	1.656	**0.0**	77.0	**0.092**	0.63	**0.00**	0.00	**0.00**	0.10	**0.06**	1.00	**0.57**	0.00
		Swale	**None**	1	**Transportation**	1.020	**0.0**	67.0	**0.048**	0.20	**0.20**	0.00	**0.04**	0.10	**0.02**	0.00	**0.00**	0.15
	LS 01-03d	None	**None**	1	**Citrus Groves**	4.580	**0.0**	43.0	**0.009**	0.17	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15
					Commercial	1.481	**0.0**	42.5	**0.009**	0.05	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.05
					LDR	2.742	**0.0**	51.3	**0.017**	0.19	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.17
					MDR	8.404	**15.7**	51.7	**0.142**	4.93	**0.00**	0.00	**0.00**	0.10	**0.49**	0.00	**0.00**	4.43
					Pasture	4.114	**0.0**	80.9	**0.119**	2.03	**0.00**	0.00	**0.00**	0.10	**0.20**	0.00	**0.00**	1.83
					Recreational	0.227	**0.0**	39.0	**0.006**	0.01	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.01
					Transportation	2.491	**0.0**	67.0	**0.048**	0.50	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.45
					Upland Mixed	13.172	**0.0**	35.2	**0.004**	0.23	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.21
					Upland Nonforested	10.135	**0.0**	43.0	**0.009**	0.38	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.34
					Utilities	0.918	**0.0**	43.0	**0.009**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.03
		Swale	**None**	1	**Transportation**	2.672	**0.0**	71.1	**0.062**	0.69	**0.20**	0.00	**0.14**	0.10	**0.06**	0.00	**0.00**	0.50
	LS 01-03e	Dry Pond	**None**	0	**MDR**	25.740	**21.7**	55.6	**0.194**	20.64	**0.80**	0.00	**16.51**	0.00	**0.00**	0.00	**0.00**	4.13
					Recreational	0.656	**0.0**	39.0	**0.006**	0.02	**0.80**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.00
					Transportation	0.066	**0.0**	47.9	**0.013**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	0.008	**0.0**	30.0	**0.002**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.174	**0.0**	43.0	**0.009**	0.01	**0.80**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.00
	LS 01-03f	Dry Pond	**None**	23	**Institutional**	0.028	**25.0**	98.0	**0.648**	0.08	**0.80**	0.00	**0.06**	1.00	**0.02**	0.00	**0.00**	0.00
	LS 01-04h	Dry Pond	**None**	0	**LDR**	0.486	**0.0**	45.3	**0.011**	0.02	**0.80**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	3.227	**48.4**	45.9	**0.398**	5.31	**0.80**	0.00	**4.25**	0.00	**0.00**	0.00	**0.00**	1.06
					Transportation	0.024	**0.0**	67.0	**0.048**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	0.009	**0.0**	30.0	**0.002**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	10.575	**0.0**	43.0	**0.009**	0.39	**0.80**	0.00	**0.31**	0.00	**0.00**	0.00	**0.00**	0.08
					Xeric Oak	5.773	**0.0**	30.0	**0.002**	0.06	**0.80**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.01
	LS 01-04i	Dry Pond	**None**	1	**MDR**	0.405	**43.3**	44.0	**0.356**	0.60	**0.80**	0.00	**0.48**	0.10	**0.01**	0.00	**0.00**	0.11
		None	**None**	1	**LDR**	8.875	**0.0**	64.1	**0.040**	1.46	**0.00**	0.00	**0.00**	0.10	**0.15**	0.00	**0.00**	1.32
					Transportation	5.079	**0.0**	74.3	**0.076**	1.60	**0.00**	0.00	**0.00**	0.10	**0.16**	0.00	**0.00**	1.44
					Upland Mixed	14.114	**0.0**	63.7	**0.039**	2.28	**0.00**	0.00	**0.00**	0.10	**0.23**	0.00	**0.00**	2.05
					Upland Nonforested	13.883	**0.0**	43.5	**0.009**	0.54	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.48

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
Hicks Ditch	**LS 01-04i**	None	**None**	1	**Utilities**	5.199	**0.0**	48.5	**0.014**	0.30	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.27
	LS 01-04j	None	**None**	6	**Citrus Groves**	2.433	**0.0**	43.0	**0.009**	0.09	**0.00**	0.00	**0.00**	0.90	**0.08**	0.00	**0.00**	0.01
					Commercial	1.366	**0.0**	44.2	**0.010**	0.06	**0.00**	0.00	**0.00**	0.90	**0.05**	0.00	**0.00**	0.01
					LDR	1.464	**0.0**	48.8	**0.014**	0.09	**0.00**	0.00	**0.00**	0.90	**0.08**	0.00	**0.00**	0.01
					MDR	4.783	**0.0**	49.6	**0.015**	0.30	**0.00**	0.00	**0.00**	0.90	**0.27**	0.00	**0.00**	0.03
					Pasture	8.955	**0.0**	49.0	**0.014**	0.53	**0.00**	0.00	**0.00**	0.90	**0.48**	0.00	**0.00**	0.05
					Transportation	0.831	**0.0**	64.5	**0.041**	0.14	**0.00**	0.00	**0.00**	0.90	**0.13**	0.00	**0.00**	0.01
	LS 01-04l	Dry Pond	**None**	0	**Institutional**	9.577	**13.7**	67.2	**0.153**	6.07	**0.80**	0.00	**4.85**	0.00	**0.00**	0.00	**0.00**	1.21
					MDR	0.877	**4.1**	50.2	**0.048**	0.17	**0.80**	0.00	**0.14**	0.00	**0.00**	0.00	**0.00**	0.03
					Transportation	0.380	**0.0**	58.3	**0.028**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
					Upland Mixed	0.053	**0.0**	30.0	**0.002**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	17.981	**0.0**	43.0	**0.009**	0.67	**0.80**	0.00	**0.53**	0.00	**0.00**	0.00	**0.00**	0.13
	LS 01-05f	Dry Pond	**None**	0	**Institutional**	0.192	**0.0**	39.0	**0.006**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	4.882	**10.1**	49.0	**0.095**	1.92	**0.80**	0.00	**1.53**	0.00	**0.00**	0.00	**0.00**	0.38
					Transportation	2.888	**0.0**	67.4	**0.049**	0.59	**0.80**	0.00	**0.47**	0.00	**0.00**	0.00	**0.00**	0.12
	LS 01-05g	Dry Pond	**None**	0	**Commercial**	4.611	**63.9**	50.6	**0.523**	9.98	**0.80**	0.00	**7.98**	0.00	**0.00**	0.00	**0.00**	2.00
					LDR	3.053	**0.0**	53.3	**0.020**	0.25	**0.80**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.05
					MDR	0.299	**0.0**	62.6	**0.036**	0.05	**0.80**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.01
					Transportation	1.784	**0.0**	74.9	**0.079**	0.58	**0.80**	0.00	**0.47**	0.00	**0.00**	0.00	**0.00**	0.12
					Upland Mixed	3.850	**0.0**	30.0	**0.002**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
					Upland Nonforested	0.546	**0.0**	43.0	**0.009**	0.02	**0.80**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.00
	LS 01-06d	None	**None**	2	**Commercial**	2.847	**47.7**	45.0	**0.392**	4.62	**0.00**	0.00	**0.00**	0.25	**1.15**	0.00	**0.00**	3.46
					MDR	20.294	**0.0**	51.5	**0.017**	1.45	**0.00**	0.00	**0.00**	0.25	**0.36**	0.00	**0.00**	1.09
					Pasture	4.134	**0.0**	49.0	**0.014**	0.25	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.18
					Transportation	2.293	**0.0**	65.1	**0.042**	0.40	**0.00**	0.00	**0.00**	0.25	**0.10**	0.00	**0.00**	0.30
					Upland Nonforested	8.021	**0.0**	43.0	**0.009**	0.30	**0.00**	0.00	**0.00**	0.25	**0.07**	0.00	**0.00**	0.22
		Swale	**None**	2	**Transportation**	1.687	**0.0**	68.0	**0.051**	0.36	**0.20**	0.00	**0.07**	0.25	**0.07**	0.00	**0.00**	0.21
	LS 01-07a	Dry Pond	**None**	0	**MDR**	14.510	**0.0**	60.3	**0.031**	1.87	**0.80**	0.00	**1.50**	0.00	**0.00**	0.00	**0.00**	0.37
					Upland Nonforested	0.003	**0.0**	43.0	**0.009**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	LS 04-04m	None	**None**	2	**LDR**	3.096	**0.0**	52.2	**0.018**	0.23	**0.00**	0.00	**0.00**	0.25	**0.06**	0.00	**0.00**	0.18
					Pasture	1.597	**0.0**	83.5	**0.146**	0.96	**0.00**	0.00	**0.00**	0.25	**0.24**	0.00	**0.00**	0.72
					Transportation	1.824	**0.0**	55.3	**0.022**	0.17	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.13
					Upland Mixed	2.260	**0.0**	50.1	**0.015**	0.14	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.11
					Upland Nonforested	0.392	**0.0**	43.0	**0.009**	0.01	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.01
TL 01-02a	**TL 01-02a**	Dry Pond	**None**	2	**Commercial**	2.650	**11.6**	75.6	**0.168**	1.84	**0.80**	0.00	**1.47**	0.25	**0.09**	0.00	**0.00**	0.28
					Multi-Family	3.816	**27.9**	76.6	**0.290**	4.59	**0.80**	0.00	**3.67**	0.25	**0.23**	0.00	**0.00**	0.69
		None	**None**	2	**Commercial**	0.698	**0.0**	87.9	**0.207**	0.60	**0.00**	0.00	**0.00**	0.25	**0.15**	0.00	**0.00**	0.45
					Institutional	1.988	**0.0**	81.6	**0.127**	1.04	**0.00**	0.00	**0.00**	0.25	**0.26**	0.00	**0.00**	0.78
					Multi-Family	0.333	**0.0**	81.2	**0.122**	0.17	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.13
					Transportation	1.659	**0.0**	77.9	**0.098**	0.67	**0.00**	0.00	**0.00**	0.25	**0.17**	0.00	**0.00**	0.50
					Upland Mixed	1.684	**0.0**	57.8	**0.027**	0.19	**0.00**	0.00	**0.00**	0.25	**0.05**	0.00	**0.00**	0.14
					Upland Nonforested	10.837	**0.0**	72.8	**0.070**	3.12	**0.00**	0.00	**0.00**	0.25	**0.78**	0.00	**0.00**	2.34
					Wetlands	9.483	**0.0**	77.0	**0.092**	3.61	**0.00**	0.00	**0.00**	0.25	**0.90**	1.00	**2.70**	0.00
		Swale	**None**	2	**Transportation**	5.774	**0.0**	76.1	**0.086**	2.06	**0.20**	0.00	**0.41**	0.25	**0.41**	0.00	**0.00**	1.23
	TL 01-03a	Dry Pond	**None**	3	**Multi-Family**	3.515	**18.8**	69.7	**0.198**	2.89	**0.80**	0.00	**2.31**	0.50	**0.29**	0.00	**0.00**	0.29
		None	**None**	3	**MDR**	16.070	**16.8**	65.4	**0.172**	11.44	**0.00**	0.00	**0.00**	0.50	**5.72**	0.00	**0.00**	5.72
					Multi-Family	0.129	**0.0**	84.1	**0.151**	0.08	**0.00**	0.00	**0.00**	0.50	**0.04**	0.00	**0.00**	0.04
					Transportation	2.036	**0.0**	78.9	**0.104**	0.87	**0.00**	0.00	**0.00**	0.50	**0.44**	0.00	**0.00**	0.44
					Upland Nonforested	1.245	**0.0**	68.2	**0.052**	0.27	**0.00**	0.00	**0.00**	0.50	**0.13**	0.00	**0.00**	0.13
					Wetlands	5.693	**0.0**	77.0	**0.092**	2.16	**0.00**	0.00	**0.00**	0.50	**1.08**	1.00	**1.08**	0.00
TL 02-01	**TL 02-01**	None	**None**	0	**LDR**	0.707	**0.0**	82.7	**0.137**	0.40	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.40
					Mobile Homes	1.339	**22.5**	80.3	**0.270**	1.50	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.50
					Pasture	6.313	**0.0**	84.0	**0.150**	3.92	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	3.92
					Wetlands	5.518	**0.0**	77.0	**0.092**	2.10	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**2.10**	0.00
		Swale	**None**	0	**Transportation**	2.209	**0.0**	84.7	**0.156**	1.43	**0.20**	0.00	**0.29**	0.00	**0.00**	0.00	**0.00**	1.14
TL 03-01	**TL 03-01**	None	**None**	0	**LDR**	0.002	**0.0**	82.7	**0.137**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
TL 03-01	TL 03-01	None	None	0	Mobile Homes	5.781	20.0	79.1	0.246	5.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.89
					Pasture	0.803	0.0	84.0	0.150	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
TL 04-01	TL 04-01	None	None	0	Mobile Homes	7.393	22.5	82.8	0.289	8.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.85
TL 05-01	TL 05-01	None	None	0	Commercial	0.935	83.6	90.2	0.717	2.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77
					Mobile Homes	22.555	22.4	83.9	0.296	27.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.68
					Pasture	1.553	0.0	84.0	0.150	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96
					Upland Mixed	7.362	0.0	77.0	0.092	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.80
					Wetlands	0.459	0.0	77.0	0.092	0.17	0.00	0.00	0.00	0.00	0.00	1.00	0.17	0.00
TL 06-01	TL 06-01	None	None	0	Upland Mixed	3.845	0.0	51.8	0.018	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
					Wetlands	18.669	0.0	77.0	0.092	7.10	0.00	0.00	0.00	0.00	0.00	1.00	7.10	0.00
TL 07-01	TL 07-01	None	None	0	Commercial	0.906	20.0	64.6	0.194	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73
					Industrial	2.291	0.0	60.0	0.030	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
					LDR	0.226	0.0	46.1	0.012	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
					MDR	49.520	7.0	56.8	0.080	16.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.41
					Multi-Family	0.326	0.0	62.5	0.036	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
					Transportation	0.133	0.0	51.7	0.018	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
					Upland Mixed	23.125	0.0	32.4	0.003	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31
					Upland Nonforested	1.970	0.0	72.7	0.069	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56
					Utilities	0.585	0.0	43.0	0.009	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
					Wetlands	42.099	0.0	77.0	0.092	16.01	0.00	0.00	0.00	0.00	0.00	1.00	16.01	0.00
	TL 07-02a	Dry Pond	None	0	Industrial	8.567	0.0	71.8	0.065	2.32	0.80	0.00	1.86	0.00	0.00	0.00	0.00	0.46
					Wetlands	0.001	0.0	77.0	0.092	0.00	0.80	0.00	0.00	0.00	0.00	1.00	0.00	0.00
	TL 07-02b	None	None	0	Commercial	4.611	19.5	65.9	0.193	3.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.69
					Industrial	0.266	0.0	45.7	0.011	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
					Institutional	4.244	0.0	70.4	0.059	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04
					MDR	92.831	9.6	46.2	0.088	33.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.96
					Multi-Family	2.666	9.8	65.4	0.118	1.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31
					Pasture	1.818	0.0	49.0	0.014	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
					Recreational	0.944	0.0	49.5	0.015	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
					Transportation	6.172	46.3	44.7	0.380	9.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.72
					Upland Mixed	5.181	0.0	30.0	0.002	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
					Upland Nonforested	2.916	0.0	53.2	0.020	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
					Wetlands	5.600	0.0	77.0	0.092	2.13	0.00	0.00	0.00	0.00	0.00	1.00	2.13	0.00
		Wet Pond	None	0	MDR	7.369	5.0	56.0	0.063	1.92	0.20	0.00	0.38	0.00	0.00	0.00	0.00	1.54
					Multi-Family	0.426	0.0	76.7	0.090	0.16	0.20	0.00	0.03	0.00	0.00	0.00	0.00	0.13
					Transportation	0.002	90.0	98.0	0.788	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Upland Nonforested	0.270	0.0	61.1	0.033	0.04	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.03
					Wetlands	0.109	0.0	77.0	0.092	0.04	0.20	0.00	0.01	0.00	0.00	1.00	0.03	0.00
	TL 07-03a	None	None	0	Institutional	0.023	4.1	41.5	0.040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					MDR	10.873	12.1	47.1	0.109	4.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.91
					Upland Mixed	13.923	0.0	60.1	0.031	1.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.77
					Wetlands	1.115	0.0	77.0	0.092	0.42	0.00	0.00	0.00	0.00	0.00	1.00	0.42	0.00
	TL 07-03b	Dry Pond	None	0	Institutional	0.658	37.5	74.4	0.351	0.96	0.80	0.00	0.77	0.00	0.00	0.00	0.00	0.19
					MDR	6.752	10.6	46.0	0.096	2.68	0.80	0.00	2.14	0.00	0.00	0.00	0.00	0.54
					Transportation	0.562	51.5	46.0	0.423	0.98	0.80	0.00	0.79	0.00	0.00	0.00	0.00	0.20
	TL 07-04a	Dry Pond	None	2	Industrial	3.587	43.4	50.3	0.360	5.35	0.80	0.00	4.28	0.25	0.27	0.00	0.00	0.80
		None	None	2	Commercial	0.750	25.8	59.5	0.231	0.72	0.00	0.00	0.00	0.25	0.18	0.00	0.00	0.54
					Institutional	1.353	18.2	52.1	0.162	0.91	0.00	0.00	0.00	0.25	0.23	0.00	0.00	0.68
					MDR	15.615	9.7	47.0	0.089	5.78	0.00	0.00	0.00	0.25	1.44	0.00	0.00	4.33
					Multi-Family	3.429	24.6	58.2	0.220	3.12	0.00	0.00	0.00	0.25	0.78	0.00	0.00	2.34
					Pasture	0.012	0.0	84.0	0.150	0.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01
					Shrub and Brushland	9.504	0.0	68.4	0.052	2.06	0.00	0.00	0.00	0.25	0.52	0.00	0.00	1.55
					Transportation	0.652	42.8	43.9	0.352	0.95	0.00	0.00	0.00	0.25	0.24	0.00	0.00	0.71
					Upland Mixed	13.973	0.0	46.8	0.012	0.71	0.00	0.00	0.00	0.25	0.18	0.00	0.00	0.53
					Upland Nonforested	0.634	0.0	43.0	0.009	0.02	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					Wetlands	3.389	0.0	77.0	0.092	1.29	0.00	0.00	0.00	0.25	0.32	1.00	0.97	0.00

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
TL 07-01	**TL 07-04b**	Dry Pond	**None**	0	**MDR**	0.315	**12.5**	47.4	**0.112**	0.15	**0.80**	0.00	**0.12**	0.00	**0.00**	0.00	**0.00**	0.03
					Wetlands	0.105	**0.0**	77.0	**0.092**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	1.00	**0.01**	0.00
	TL 07-04c	Dry Pond	**None**	0	**Commercial**	1.292	**34.2**	47.3	**0.285**	1.53	**0.80**	0.00	**1.22**	0.00	**0.00**	0.00	**0.00**	0.31
					Institutional	0.212	**0.0**	40.2	**0.007**	0.01	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	8.259	**11.2**	46.4	**0.101**	3.45	**0.80**	0.00	**2.76**	0.00	**0.00**	0.00	**0.00**	0.69
					Multi-Family	3.709	**26.7**	60.5	**0.239**	3.67	**0.80**	0.00	**2.93**	0.00	**0.00**	0.00	**0.00**	0.73
					Pasture	1.461	**0.0**	49.0	**0.014**	0.09	**0.80**	0.00	**0.07**	0.00	**0.00**	0.00	**0.00**	0.02
					Upland Mixed	0.010	**0.0**	30.0	**0.002**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	TL 07-04d	Dry Pond	**None**	0	**Institutional**	3.064	**24.6**	69.6	**0.242**	3.07	**0.80**	0.00	**2.45**	0.00	**0.00**	0.00	**0.00**	0.61
					MDR	2.632	**10.9**	46.2	**0.098**	1.07	**0.80**	0.00	**0.86**	0.00	**0.00**	0.00	**0.00**	0.21
					Multi-Family	0.439	**7.3**	57.5	**0.083**	0.15	**0.80**	0.00	**0.12**	0.00	**0.00**	0.00	**0.00**	0.03
					Transportation	0.467	**59.9**	48.8	**0.490**	0.95	**0.80**	0.00	**0.76**	0.00	**0.00**	0.00	**0.00**	0.19
	TL 07-05a	None	**None**	0	**Institutional**	0.012	**0.0**	39.0	**0.006**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	3.564	**7.3**	46.9	**0.071**	1.04	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.04
					Recreational	2.763	**0.0**	67.9	**0.051**	0.58	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.58
	TL 07-05b	Wet Pond	**None**	0	**Institutional**	1.120	**0.0**	80.7	**0.118**	0.55	**0.20**	0.00	**0.11**	0.00	**0.00**	0.00	**0.00**	0.44
					MDR	7.989	**3.1**	47.1	**0.037**	1.23	**0.20**	0.00	**0.25**	0.00	**0.00**	0.00	**0.00**	0.98
					Pasture	0.728	**0.0**	84.0	**0.150**	0.45	**0.20**	0.00	**0.09**	0.00	**0.00**	0.00	**0.00**	0.36
					Recreational	0.053	**0.0**	85.9	**0.174**	0.04	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.03
					Transportation	3.328	**42.8**	43.9	**0.352**	4.84	**0.20**	0.00	**0.97**	0.00	**0.00**	0.00	**0.00**	3.87
					Upland Mixed	0.189	**0.0**	77.0	**0.092**	0.07	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.06
					Upland Nonforested	1.794	**0.0**	43.0	**0.009**	0.07	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.05
					Xeric Oak	0.484	**0.0**	30.0	**0.002**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	TL 07-05c	Wet Pond	**None**	0	**Commercial**	0.427	**41.9**	81.6	**0.413**	0.73	**0.20**	0.00	**0.15**	0.00	**0.00**	0.00	**0.00**	0.58
					Institutional	0.941	**0.0**	63.1	**0.038**	0.15	**0.20**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.12
					MDR	2.067	**9.5**	46.0	**0.087**	0.75	**0.20**	0.00	**0.15**	0.00	**0.00**	0.00	**0.00**	0.60
					Recreational	0.392	**0.0**	45.0	**0.010**	0.02	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
	TL 07-05d	Dry Pond	**None**	0	**Commercial**	0.979	**70.8**	54.9	**0.579**	2.35	**0.80**	0.00	**1.88**	0.00	**0.00**	0.00	**0.00**	0.47
					Pasture	0.012	**0.0**	49.0	**0.014**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	TL 07-05e	Dry Pond	**None**	0	**Commercial**	0.255	**58.1**	48.1	**0.476**	0.50	**0.80**	0.00	**0.40**	0.00	**0.00**	0.00	**0.00**	0.10
	TL 07-05f	Dry Pond	**None**	0	**Institutional**	4.023	**0.0**	69.6	**0.056**	0.94	**0.80**	0.00	**0.75**	0.00	**0.00**	0.00	**0.00**	0.19
					MDR	0.423	**12.5**	47.4	**0.112**	0.20	**0.80**	0.00	**0.16**	0.00	**0.00**	0.00	**0.00**	0.04
	TL 07-06a	Dry Pond	**None**	1	**MDR**	14.487	**2.2**	60.2	**0.048**	2.90	**0.80**	0.00	**2.32**	0.10	**0.06**	0.00	**0.00**	0.52
		None	**None**	1	**Commercial**	0.490	**0.0**	70.0	**0.057**	0.12	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.10
					LDR	0.835	**0.0**	46.8	**0.012**	0.04	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					Pasture	6.637	**0.0**	49.0	**0.014**	0.40	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.36
					Recreational	5.980	**0.0**	58.5	**0.028**	0.69	**0.00**	0.00	**0.00**	0.10	**0.07**	0.00	**0.00**	0.62
					Transportation	1.023	**0.0**	69.3	**0.055**	0.23	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.21
					Upland Mixed	4.976	**0.0**	30.0	**0.002**	0.05	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.04
					Wetlands	2.659	**0.0**	77.0	**0.092**	1.01	**0.00**	0.00	**0.00**	0.10	**0.10**	1.00	**0.91**	0.00
	TL 07-06b	Dry Pond	**None**	0	**Commercial**	0.238	**0.0**	39.0	**0.006**	0.01	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	28.124	**0.0**	62.6	**0.036**	4.24	**0.80**	0.00	**3.39**	0.00	**0.00**	0.00	**0.00**	0.85
					Recreational	0.421	**0.0**	54.9	**0.022**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
					Transportation	0.380	**0.0**	86.8	**0.189**	0.30	**0.80**	0.00	**0.24**	0.00	**0.00**	0.00	**0.00**	0.06
					Upland Nonforested	0.041	**0.0**	43.0	**0.009**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	TL 07-07a	Wet Pond	**None**	0	**MDR**	2.149	**0.0**	48.2	**0.014**	0.12	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.10
					Recreational	7.825	**0.0**	76.0	**0.086**	2.77	**0.20**	0.00	**0.55**	0.00	**0.00**	0.00	**0.00**	2.22
	TL 07-07b	None	**None**	9	**Commercial**	1.211	**32.8**	67.8	**0.299**	1.50	**0.00**	0.00	**0.00**	1.00	**1.50**	0.00	**0.00**	0.00
					MDR	2.999	**11.3**	46.5	**0.102**	1.27	**0.00**	0.00	**0.00**	1.00	**1.27**	0.00	**0.00**	0.00
					Recreational	0.552	**0.0**	43.4	**0.009**	0.02	**0.00**	0.00	**0.00**	1.00	**0.02**	0.00	**0.00**	0.00
					Upland Mixed	2.750	**0.0**	30.0	**0.002**	0.03	**0.00**	0.00	**0.00**	1.00	**0.03**	0.00	**0.00**	0.00
					Wet Prairies	0.926	**0.0**	73.0	**0.071**	0.27	**0.00**	0.00	**0.00**	1.00	**0.27**	1.00	**0.00**	0.00
TL 08-01	**TL 08-01**	None	**None**	0	**Commercial**	1.415	**30.0**	71.6	**0.288**	1.68	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.68
					LDR	0.583	**0.0**	57.0	**0.025**	0.06	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.06
					MDR	6.271	**0.0**	61.2	**0.033**	0.86	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.86
					Transportation	2.477	**0.0**	80.7	**0.118**	1.21	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.21

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
TL 08-01	**TL 08-01**	None	**None**	0	**Upland Nonforested**	4.723	**0.0**	61.8	**0.035**	0.68	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.68
					Wetlands	14.801	**0.0**	77.0	**0.092**	5.63	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**5.63**	0.00
TL 09-01	**TL 09-01**	Dry Pond	**None**	0	**Commercial**	1.401	**56.4**	61.8	**0.472**	2.74	**0.80**	0.00	**2.19**	0.00	**0.00**	0.00	**0.00**	0.55
					Transportation	0.006	**0.0**	66.9	**0.048**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.040	**0.0**	51.8	**0.018**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
TLW 01-01	**TLW 01-01**	None	**None**	0	**Commercial**	0.673	**7.3**	78.6	**0.153**	0.43	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.43
					Industrial	2.884	**0.0**	91.1	**0.277**	3.31	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	3.31
					Institutional	1.676	**0.0**	84.4	**0.154**	1.07	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.07
					Mining	5.948	**0.0**	89.0	**0.225**	5.55	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	5.55
					Mobile Homes	1.000	**22.5**	85.2	**0.308**	1.27	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	1.27
					Pasture	14.723	**0.0**	81.7	**0.128**	7.79	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	7.79
					Transportation	8.465	**0.0**	72.0	**0.066**	2.32	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	2.32
					Upland Mixed	82.083	**0.0**	75.7	**0.084**	28.38	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	28.38
					Upland Nonforested	1.117	**0.0**	80.6	**0.117**	0.54	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.54
					Utilities	1.474	**0.0**	43.0	**0.009**	0.05	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.05
					Wetlands	166.849	**0.0**	77.0	**0.092**	63.44	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**63.44**	0.00
		Swale	**None**	0	**Transportation**	1.838	**0.0**	70.0	**0.057**	0.44	**0.20**	0.00	**0.09**	0.00	**0.00**	0.00	**0.00**	0.35
	TLW 01-02a	None	**None**	0	**Transportation**	0.106	**0.0**	98.0	**0.595**	0.26	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.26
		Wet Pond	**None**	0	**Commercial**	12.431	**63.2**	83.4	**0.565**	29.06	**0.20**	0.00	**5.81**	0.00	**0.00**	0.00	**0.00**	23.24
					Mobile Homes	0.030	**22.5**	85.2	**0.309**	0.04	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.03
					Transportation	0.048	**0.0**	80.0	**0.111**	0.02	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Upland Mixed	0.003	**0.0**	77.0	**0.092**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	TLW 01-02b	None	**None**	0	**Commercial**	0.594	**21.5**	80.5	**0.265**	0.65	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.65
					Mobile Homes	0.182	**22.5**	85.2	**0.309**	0.23	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.23
					Transportation	4.034	**0.0**	90.9	**0.271**	4.52	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	4.52
	TLW 01-02c	None	**None**	1	**MDR**	2.069	**0.0**	81.4	**0.125**	1.07	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.96
					Pine Flatwoods	7.135	**0.0**	76.5	**0.089**	2.62	**0.00**	0.00	**0.00**	0.10	**0.26**	0.00	**0.00**	2.36
					Transportation	0.751	**0.0**	84.3	**0.152**	0.47	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.43
					Upland Mixed	7.820	**0.0**	76.9	**0.091**	2.95	**0.00**	0.00	**0.00**	0.10	**0.30**	0.00	**0.00**	2.66
					Wetlands	0.882	**0.0**	77.0	**0.092**	0.34	**0.00**	0.00	**0.00**	0.10	**0.03**	1.00	**0.30**	0.00
	TLW 01-02d	None	**None**	6	**Commercial**	1.604	**0.0**	62.2	**0.036**	0.24	**0.00**	0.00	**0.00**	0.90	**0.21**	0.00	**0.00**	0.02
					Institutional	0.464	**0.0**	42.7	**0.009**	0.02	**0.00**	0.00	**0.00**	0.90	**0.02**	0.00	**0.00**	0.00
					Pasture	30.759	**0.0**	79.7	**0.109**	13.91	**0.00**	0.00	**0.00**	0.90	**12.52**	0.00	**0.00**	1.39
					Transportation	0.522	**0.0**	79.8	**0.109**	0.24	**0.00**	0.00	**0.00**	0.90	**0.21**	0.00	**0.00**	0.02
					Wetlands	10.676	**0.0**	77.0	**0.092**	4.06	**0.00**	0.00	**0.00**	0.90	**3.65**	1.00	**0.41**	0.00
		Swale	**None**	6	**Transportation**	2.241	**0.0**	68.4	**0.053**	0.49	**0.20**	0.00	**0.10**	0.90	**0.35**	0.00	**0.00**	0.04
	TLW 01-02e	None	**None**	1	**Institutional**	3.335	**0.0**	55.8	**0.023**	0.32	**0.00**	0.00	**0.00**	0.10	**0.03**	0.00	**0.00**	0.29
					Pasture	15.800	**0.0**	74.6	**0.078**	5.08	**0.00**	0.00	**0.00**	0.10	**0.51**	0.00	**0.00**	4.57
					Pine Flatwoods	14.073	**0.0**	77.0	**0.092**	5.35	**0.00**	0.00	**0.00**	0.10	**0.54**	0.00	**0.00**	4.82
					Recreational	1.532	**0.0**	74.1	**0.075**	0.48	**0.00**	0.00	**0.00**	0.10	**0.05**	0.00	**0.00**	0.43
					Transportation	1.514	**0.0**	70.1	**0.058**	0.36	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.33
					Upland Mixed	7.635	**0.0**	61.5	**0.034**	1.07	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.97
					Wetlands	35.483	**0.0**	77.0	**0.092**	13.49	**0.00**	0.00	**0.00**	0.10	**1.35**	1.00	**12.14**	0.00
	TLW 01-02f	None	**None**	2	**Recreational**	5.698	**0.0**	57.6	**0.026**	0.62	**0.00**	0.00	**0.00**	0.25	**0.16**	0.00	**0.00**	0.47
					Transportation	1.623	**0.0**	72.1	**0.067**	0.45	**0.00**	0.00	**0.00**	0.25	**0.11**	0.00	**0.00**	0.34
					Wetlands	3.430	**0.0**	77.0	**0.092**	1.30	**0.00**	0.00	**0.00**	0.25	**0.33**	1.00	**0.98**	0.00
	TLW 01-02g	None	**None**	0	**Infiltration Pond**	14.070	**0.0**	0.0	**0.000**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Utilities	3.866	**0.0**	43.0	**0.009**	0.14	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.14
	TLW 01-02h	None	**None**	2	**Upland Mixed**	9.211	**0.0**	34.9	**0.004**	0.16	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.12
					Utilities	1.080	**0.0**	43.0	**0.009**	0.04	**0.00**	0.00	**0.00**	0.25	**0.01**	0.00	**0.00**	0.03
					Wetlands	12.690	**0.0**	77.0	**0.092**	4.83	**0.00**	0.00	**0.00**	0.25	**1.21**	1.00	**3.62**	0.00
	TLW 01-03a	Wet Pond	**None**	0	**Commercial**	7.658	**76.3**	80.8	**0.646**	20.48	**0.20**	0.00	**4.10**	0.00	**0.00**	0.00	**0.00**	16.38
					Multi-Family	0.031	**21.9**	70.9	**0.225**	0.03	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.02
					Pasture	1.582	**0.0**	73.5	**0.073**	0.48	**0.20**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.38
					Upland Mixed	4.363	**0.0**	60.8	**0.032**	0.58	**0.20**	0.00	**0.12**	0.00	**0.00**	0.00	**0.00**	0.47
					Upland Nonforested	2.293	**0.0**	74.6	**0.078**	0.74	**0.20**	0.00	**0.15**	0.00	**0.00**	0.00	**0.00**	0.59

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
TLW 01-01	**TLW 01-03b**	Swale	**None**	0	**Commercial**	1.447	**24.2**	69.0	**0.237**	1.42	**0.20**	0.00	**0.28**	0.00	**0.00**	0.00	**0.00**	1.13
					Institutional	3.838	**1.5**	66.0	**0.056**	0.90	**0.20**	0.00	**0.18**	0.00	**0.00**	0.00	**0.00**	0.72
					MDR	0.076	**20.0**	70.3	**0.209**	0.07	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.05
					Multi-Family	0.524	**21.2**	55.9	**0.190**	0.41	**0.20**	0.00	**0.08**	0.00	**0.00**	0.00	**0.00**	0.33
					Pine Flatwoods	0.286	**0.0**	77.0	**0.092**	0.11	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.09
					Transportation	7.956	**0.0**	82.7	**0.138**	4.53	**0.20**	0.00	**0.91**	0.00	**0.00**	0.00	**0.00**	3.62
					Upland Mixed	0.317	**0.0**	77.0	**0.092**	0.12	**0.20**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.10
					Upland Nonforested	0.924	**0.0**	82.0	**0.130**	0.50	**0.20**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.40
	TLW 01-03c	None	**None**	1	**Pasture**	3.145	**0.0**	80.7	**0.117**	1.53	**0.00**	0.00	**0.00**	0.10	**0.15**	0.00	**0.00**	1.38
					Pine Flatwoods	0.294	**0.0**	55.0	**0.022**	0.03	**0.00**	0.00	**0.00**	0.10	**0.00**	0.00	**0.00**	0.02
					Transportation	1.556	**0.0**	84.4	**0.154**	0.99	**0.00**	0.00	**0.00**	0.10	**0.10**	0.00	**0.00**	0.89
					Upland Mixed	6.253	**0.0**	68.7	**0.054**	1.39	**0.00**	0.00	**0.00**	0.10	**0.14**	0.00	**0.00**	1.25
	TLW 01-03d	None	**None**	1	**Pasture**	0.357	**0.0**	75.4	**0.082**	0.12	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.11
					Pine Flatwoods	5.026	**0.0**	68.5	**0.053**	1.10	**0.00**	0.00	**0.00**	0.10	**0.11**	0.00	**0.00**	0.99
					Upland Mixed	0.907	**0.0**	60.0	**0.030**	0.11	**0.00**	0.00	**0.00**	0.10	**0.01**	0.00	**0.00**	0.10
					Wet Prairies	0.737	**0.0**	73.0	**0.071**	0.22	**0.00**	0.00	**0.00**	0.10	**0.02**	1.00	**0.19**	0.00
	TLW 01-03e	None	**None**	1	**Commercial**	0.242	**7.6**	80.2	**0.166**	0.17	**0.00**	0.00	**0.00**	0.10	**0.02**	0.00	**0.00**	0.15
					Transportation	0.901	**0.0**	84.0	**0.150**	0.56	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.50
					Upland Mixed	6.798	**0.0**	77.0	**0.092**	2.58	**0.00**	0.00	**0.00**	0.10	**0.26**	0.00	**0.00**	2.33
	TLW 01-03f	Wet Pond	**None**	0	**Commercial**	1.914	**77.3**	86.8	**0.669**	5.30	**0.20**	0.00	**1.06**	0.00	**0.00**	0.00	**0.00**	4.24
					MDR	3.356	**0.0**	71.5	**0.064**	0.89	**0.20**	0.00	**0.18**	0.00	**0.00**	0.00	**0.00**	0.71
					Transportation	0.272	**0.0**	85.9	**0.175**	0.20	**0.20**	0.00	**0.04**	0.00	**0.00**	0.00	**0.00**	0.16
					Upland Mixed	2.650	**0.0**	77.0	**0.092**	1.01	**0.20**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.81
	TLW 01-03g	None	**None**	1	**LDR**	0.829	**0.0**	80.9	**0.120**	0.41	**0.00**	0.00	**0.00**	0.10	**0.04**	0.00	**0.00**	0.37
					Pasture	7.085	**0.0**	82.0	**0.130**	3.82	**0.00**	0.00	**0.00**	0.10	**0.38**	0.00	**0.00**	3.44
		Swale	**None**	1	**Transportation**	0.989	**0.0**	75.3	**0.081**	0.33	**0.20**	0.00	**0.07**	0.10	**0.03**	0.00	**0.00**	0.24
	TLW 01-03h	Swale	**None**	0	**LDR**	4.936	**0.0**	75.8	**0.085**	1.73	**0.20**	0.00	**0.35**	0.00	**0.00**	0.00	**0.00**	1.38
					MDR	0.001	**0.0**	53.8	**0.020**	0.00	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Pasture	68.709	**0.0**	71.9	**0.066**	18.71	**0.20**	0.00	**3.74**	0.00	**0.00**	0.00	**0.00**	14.97
					Pine Flatwoods	21.950	**0.0**	77.0	**0.092**	8.35	**0.20**	0.00	**1.67**	0.00	**0.00**	0.00	**0.00**	6.68
					Transportation	9.936	**0.0**	62.0	**0.035**	1.44	**0.20**	0.00	**0.29**	0.00	**0.00**	0.00	**0.00**	1.15
					Upland Mixed	4.552	**0.0**	77.0	**0.092**	1.73	**0.20**	0.00	**0.35**	0.00	**0.00**	0.00	**0.00**	1.38
					Wet Prairies	1.017	**0.0**	73.0	**0.071**	0.30	**0.20**	0.00	**0.06**	0.00	**0.00**	1.00	**0.24**	0.00
					Wetlands	14.540	**0.0**	77.0	**0.092**	5.53	**0.20**	0.00	**1.11**	0.00	**0.00**	1.00	**4.42**	0.00
	TLW 01-03i	Wet Pond	**None**	0	**LDR**	0.328	**0.0**	49.2	**0.015**	0.02	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					MDR	0.103	**12.5**	47.4	**0.112**	0.05	**0.20**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.04
					Recreational	3.451	**0.0**	55.4	**0.023**	0.32	**0.20**	0.00	**0.06**	0.00	**0.00**	0.00	**0.00**	0.26
					Transportation	1.528	**0.0**	68.3	**0.052**	0.33	**0.20**	0.00	**0.07**	0.00	**0.00**	0.00	**0.00**	0.26
					Upland Mixed	2.478	**0.0**	30.1	**0.002**	0.02	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Utilities	0.618	**0.0**	43.0	**0.009**	0.02	**0.20**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Wetlands	0.033	**0.0**	77.0	**0.092**	0.01	**0.20**	0.00	**0.00**	0.00	**0.00**	1.00	**0.01**	0.00
	TLW 01-03j	Swale	**None**	0	**Commercial**	0.623	**80.5**	88.2	**0.693**	1.79	**0.20**	0.00	**0.36**	0.00	**0.00**	0.00	**0.00**	1.43
					Mobile Homes	1.007	**22.5**	85.1	**0.307**	1.28	**0.20**	0.00	**0.26**	0.00	**0.00**	0.00	**0.00**	1.02
					Pasture	2.228	**0.0**	84.0	**0.150**	1.38	**0.20**	0.00	**0.28**	0.00	**0.00**	0.00	**0.00**	1.11
					Transportation	3.026	**0.0**	84.5	**0.155**	1.94	**0.20**	0.00	**0.39**	0.00	**0.00**	0.00	**0.00**	1.55
	TLW 01-04a	Dry Pond	**None**	0	**Commercial**	0.749	**41.6**	63.9	**0.360**	1.11	**0.80**	0.00	**0.89**	0.00	**0.00**	0.00	**0.00**	0.22
					Multi-Family	6.231	**29.4**	66.9	**0.272**	7.01	**0.80**	0.00	**5.61**	0.00	**0.00**	0.00	**0.00**	1.40
					Pasture	0.667	**0.0**	49.1	**0.015**	0.04	**0.80**	0.00	**0.03**	0.00	**0.00**	0.00	**0.00**	0.01
					Transportation	0.075	**0.0**	54.4	**0.021**	0.01	**0.80**	0.00	**0.01**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	1.360	**0.0**	68.5	**0.053**	0.30	**0.80**	0.00	**0.24**	0.00	**0.00**	0.00	**0.00**	0.06
	TLW 01-04b	None	**None**	2	**Institutional**	1.435	**1.2**	65.1	**0.052**	0.31	**0.00**	0.00	**0.00**	0.25	**0.08**	0.00	**0.00**	0.23
					Multi-Family	0.008	**14.2**	67.1	**0.157**	0.01	**0.00**	0.00	**0.00**	0.25	**0.00**	0.00	**0.00**	0.00
					Upland Mixed	1.100	**0.0**	60.2	**0.031**	0.14	**0.00**	0.00	**0.00**	0.25	**0.04**	0.00	**0.00**	0.11
	TLW 01-04c	None	**None**	1	**LDR**	1.041	**0.0**	82.0	**0.131**	0.56	**0.00**	0.00	**0.00**	0.10	**0.06**	0.00	**0.00**	0.51
					Pasture	45.180	**0.0**	80.0	**0.111**	20.77	**0.00**	0.00	**0.00**	0.10	**2.08**	0.00	**0.00**	18.69
					Pine Flatwoods	7.646	**0.0**	77.0	**0.092**	2.91	**0.00**	0.00	**0.00**	0.10	**0.29**	0.00	**0.00**	2.62

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
TLW 01-01	TLW 01-04d	None	None	0	Multi-Family	0.347	0.0	59.5	0.030	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
		Swale	None	0	Citrus Groves	6.893	0.0	43.0	0.009	0.26	0.20	0.00	0.05	0.00	0.00	0.00	0.00	0.21
					LDR	5.349	0.0	73.7	0.074	1.63	0.20	0.00	0.33	0.00	0.00	0.00	0.00	1.31
					MDR	46.928	8.9	47.1	0.084	16.25	0.20	0.00	3.25	0.00	0.00	0.00	0.00	13.00
					Nurseries	0.030	0.0	49.0	0.014	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Pine Flatwoods	20.733	0.0	77.0	0.092	7.88	0.20	0.00	1.58	0.00	0.00	0.00	0.00	6.31
					Shrub and Brushland	22.344	0.0	73.0	0.071	6.52	0.20	0.00	1.30	0.00	0.00	0.00	0.00	5.22
					Transportation	3.779	0.0	59.7	0.030	0.47	0.20	0.00	0.09	0.00	0.00	0.00	0.00	0.38
					Upland Mixed	3.772	0.0	76.8	0.091	1.41	0.20	0.00	0.28	0.00	0.00	0.00	0.00	1.13
					Upland Nonforested	2.748	0.0	82.0	0.130	1.48	0.20	0.00	0.30	0.00	0.00	0.00	0.00	1.19
					Wetlands	2.425	0.0	77.0	0.092	0.92	0.20	0.00	0.18	0.00	0.00	1.00	0.74	0.00
	TLW 01-04e	None	None	2	Institutional	0.541	0.0	44.6	0.010	0.02	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					LDR	0.948	0.0	47.2	0.013	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					MDR	4.695	8.0	48.8	0.078	1.52	0.00	0.00	0.00	0.25	0.38	0.00	0.00	1.14
					Multi-Family	1.253	0.0	67.3	0.049	0.26	0.00	0.00	0.00	0.25	0.06	0.00	0.00	0.19
					Recreational	9.063	0.0	63.1	0.038	1.41	0.00	0.00	0.00	0.25	0.35	0.00	0.00	1.06
					Transportation	0.139	0.0	77.4	0.094	0.05	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.04
					Upland Mixed	2.316	0.0	31.7	0.003	0.03	0.00	0.00	0.00	0.25	0.01	0.00	0.00	0.02
					Upland Nonforested	6.273	0.0	47.5	0.013	0.33	0.00	0.00	0.00	0.25	0.08	0.00	0.00	0.25
					Wetlands	7.597	0.0	77.0	0.092	2.89	0.00	0.00	0.00	0.25	0.72	1.00	2.17	0.00
	TLW 01-04f	None	None	5	LDR	1.130	0.0	47.4	0.013	0.06	0.00	0.00	0.00	0.80	0.05	0.00	0.00	0.01
					MDR	0.171	12.5	47.4	0.112	0.08	0.00	0.00	0.00	0.80	0.06	0.00	0.00	0.02
					Transportation	0.692	0.0	77.4	0.094	0.27	0.00	0.00	0.00	0.80	0.22	0.00	0.00	0.05
					Upland Mixed	8.237	0.0	30.5	0.003	0.09	0.00	0.00	0.00	0.80	0.07	0.00	0.00	0.02
					Upland Nonforested	1.531	0.0	43.4	0.009	0.06	0.00	0.00	0.00	0.80	0.05	0.00	0.00	0.01
					Utilities	1.388	0.0	43.0	0.009	0.05	0.00	0.00	0.00	0.80	0.04	0.00	0.00	0.01
					Wet Prairies	1.962	0.0	73.0	0.071	0.57	0.00	0.00	0.00	0.80	0.46	1.00	0.11	0.00
	TLW 01-04j	Dry Pond	None	0	LDR	0.042	0.0	50.6	0.016	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					MDR	0.091	3.6	47.1	0.041	0.02	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.00
					Pasture	0.376	0.0	49.0	0.014	0.02	0.80	0.00	0.02	0.00	0.00	0.00	0.00	0.00
					Transportation	3.598	0.0	63.2	0.038	0.56	0.80	0.00	0.45	0.00	0.00	0.00	0.00	0.11
					Upland Nonforested	0.278	0.0	43.0	0.009	0.01	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	TLW 01-04k	Swale	None	0	Commercial	0.221	18.0	80.4	0.240	0.22	0.20	0.00	0.04	0.00	0.00	0.00	0.00	0.18
					MDR	0.904	0.0	52.3	0.018	0.07	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.05
					Transportation	3.248	0.0	67.1	0.048	0.65	0.20	0.00	0.13	0.00	0.00	0.00	0.00	0.52
	TLW 01-05a	None	None	1	Pasture	6.147	0.0	84.0	0.150	3.82	0.00	0.00	0.00	0.10	0.38	0.00	0.00	3.43
					Transportation	1.029	0.0	69.3	0.055	0.24	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.21
					Wet Prairies	1.441	0.0	73.0	0.071	0.42	0.00	0.00	0.00	0.10	0.04	1.00	0.38	0.00
	TLW 01-05b	None	None	2	LDR	3.282	0.0	63.1	0.038	0.51	0.00	0.00	0.00	0.25	0.13	0.00	0.00	0.38
					Nurseries	0.629	0.0	58.6	0.028	0.07	0.00	0.00	0.00	0.25	0.02	0.00	0.00	0.05
					Shrub and Brushland	4.270	0.0	70.0	0.058	1.02	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.76
					Transportation	0.347	42.8	43.9	0.352	0.50	0.00	0.00	0.00	0.25	0.13	0.00	0.00	0.38
					Upland Mixed	2.619	0.0	77.0	0.092	1.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.75
					Upland Nonforested	0.006	0.0	82.0	0.130	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
					Wetlands	22.552	0.0	77.0	0.092	8.58	0.00	0.00	0.00	0.25	2.14	1.00	6.43	0.00
	TLW 01-05c	None	None	1	LDR	2.151	0.0	52.1	0.018	0.16	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.15
					MDR	1.063	3.4	47.4	0.040	0.18	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.16
					Nurseries	6.441	0.0	62.0	0.035	0.94	0.00	0.00	0.00	0.10	0.09	0.00	0.00	0.84
					Pine Flatwoods	1.301	0.0	77.0	0.092	0.49	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.45
					Recreational	6.891	0.0	76.0	0.086	2.44	0.00	0.00	0.00	0.10	0.24	0.00	0.00	2.20
					Shrub and Brushland	1.314	0.0	73.0	0.070	0.38	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.34
					Transportation	0.893	42.8	43.9	0.352	1.30	0.00	0.00	0.00	0.10	0.13	0.00	0.00	1.17
					Upland Nonforested	1.484	0.0	82.0	0.130	0.80	0.00	0.00	0.00	0.10	0.08	0.00	0.00	0.72
					Wetlands	1.617	0.0	77.0	0.092	0.61	0.00	0.00	0.00	0.10	0.06	1.00	0.55	0.00
	TLW 01-05d	Wet Pond	None	0	MDR	2.122	2.8	45.8	0.034	0.29	0.20	0.00	0.06	0.00	0.00	0.00	0.00	0.24
					Transportation	0.052	0.0	67.0	0.048	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.01

Basin	Sub Basin	Treatment 1	Treatment 2	Treatment Depth (ft)	Land Use	Area (ac.)	DCIA1 (%)	Non - DCIA CN Value2	Runoff C Value4	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Runoff Volume Reduction Factor 2	Stormwater Reduction Volume (ac-ft)	Depression Runoff Volume Reduction Factor 3	Depression Runoff Volume Reduction (ac-ft)	Wetland Reduction Factor	Wetland Reduction Volume (ac-ft)	Runoff Volume (ac-ft)
TLW 01-01	**TLW 01-05e**	Wet Pond	**None**	0	**Multi-Family**	8.763	**0.0**	63.8	**0.039**	1.42	**0.20**	0.00	**0.28**	0.00	**0.00**	0.00	**0.00**	1.14
	TLW 01-05f	None	**None**	4	**Institutional**	1.311	**0.0**	56.0	**0.024**	0.13	**0.00**	0.00	**0.00**	0.65	**0.08**	0.00	**0.00**	0.04
					MDR	17.415	**3.3**	48.0	**0.040**	2.88	**0.00**	0.00	**0.00**	0.65	**1.87**	0.00	**0.00**	1.01
					Recreational	3.227	**0.0**	62.7	**0.037**	0.49	**0.00**	0.00	**0.00**	0.65	**0.32**	0.00	**0.00**	0.17
					Upland Mixed	4.395	**0.0**	74.4	**0.077**	1.40	**0.00**	0.00	**0.00**	0.65	**0.91**	0.00	**0.00**	0.49
					Wetlands	2.547	**0.0**	77.0	**0.092**	0.97	**0.00**	0.00	**0.00**	0.65	**0.63**	1.00	**0.34**	0.00
	TLW 01-05g	Dry Pond	**None**	0	**Institutional**	0.036	**0.0**	39.0	**0.006**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					MDR	6.228	**12.2**	47.2	**0.110**	2.84	**0.80**	0.00	**2.27**	0.00	**0.00**	0.00	**0.00**	0.57
					Upland Mixed	2.914	**0.0**	30.0	**0.002**	0.03	**0.80**	0.00	**0.02**	0.00	**0.00**	0.00	**0.00**	0.01
					Upland Nonforested	0.009	**0.0**	43.0	**0.009**	0.00	**0.80**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
	TLW 01-06a	None	**None**	4	**LDR**	0.570	**0.0**	81.9	**0.130**	0.31	**0.00**	0.00	**0.00**	0.65	**0.20**	0.00	**0.00**	0.11
					Upland Mixed	0.062	**0.0**	77.0	**0.092**	0.02	**0.00**	0.00	**0.00**	0.65	**0.02**	0.00	**0.00**	0.01
					Upland Nonforested	2.166	**0.0**	82.0	**0.130**	1.17	**0.00**	0.00	**0.00**	0.65	**0.76**	0.00	**0.00**	0.41
					Wetlands	3.862	**0.0**	77.0	**0.092**	1.47	**0.00**	0.00	**0.00**	0.65	**0.95**	1.00	**0.51**	0.00
	TLW 01-06c	Wet Pond	**None**	0	**Recreational**	0.624	**0.0**	87.0	**0.193**	0.50	**0.20**	0.00	**0.10**	0.00	**0.00**	0.00	**0.00**	0.40
Trout Lake	**Trout Lake**	None	**None**	0	**Commercial**	0.057	**0.0**	61.0	**0.033**	0.01	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.01
					LDR	0.075	**0.0**	68.3	**0.052**	0.02	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					MDR	0.092	**0.0**	69.0	**0.054**	0.02	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Mobile Homes	0.061	**22.5**	71.8	**0.233**	0.06	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.06
					Transportation	0.004	**0.0**	61.0	**0.033**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00
					Upland Nonforested	0.140	**0.0**	65.0	**0.042**	0.02	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	0.02
					Wetlands	1.616	**0.0**	77.0	**0.092**	0.61	**0.00**	0.00	**0.00**	0.00	**0.00**	1.00	**0.61**	0.00

APPENDIX G

SEEPAGE METER FIELD DATA

G.1 Lake Yale
G.2 Trout Lake

G.1 Lake Yale

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 1

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	9:55	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:04	7.5	6/4/15	9:55	32.9	0.84	Measured volume, no sample collected
7/30/15	7:52	6	7/7/15	8:04	23.0	0.97	Sample collected, bag in good condition
8/28/15	9:04	10.75	7/30/15	7:52	29.1	1.37	Sample collected, bag in good condition
9/22/15	9:48	5.75	8/28/15	9:04	25.0	0.85	Sample collected, bag in good condition
12/15/15	10:11	4.25	9/22/15	9:48	84.0	0.19	Sample collected, bag in good condition
2/3/16	10:40	3.75	12/15/15	10:11	50.0	0.28	Sample collected, bag in good condition
4/26/16	9:08	8.25	2/3/16	10:40	82.9	0.37	Sample collected, bag in good condition
6/21/16	8:50	8	4/26/16	9:08	56.0	0.53	Sample collected, bag in good condition
8/11/16	8:39	8.5	6/21/16	8:50	51.0	0.62	Sample collected, bag in good condition
10/25/16	11:52	9	8/11/16	8:39	75.1	0.44	Sample collected, bag in good condition
				Mean Value:		**0.52**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 2

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	10:12	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:11	10.25	6/4/15	10:12	32.9	1.15	Measured volume, no sample collected
7/30/15	8:04	9.75	7/7/15	8:11	23.0	1.57	Sample collected, bag in good condition
8/28/15	9:10	-----	7/30/15	8:04	-----	-----	No sample collected, meter flipped, reinstalled
9/22/15	9:55	4.5	8/28/15	9:10	25.0	0.67	Sample collected, bag in good condition
12/15/15	10:16	7.5	9/22/15	9:55	84.0	0.33	Sample collected, bag in good condition
2/3/16	10:46	6.25	12/15/15	10:16	50.0	0.46	Sample collected, bag in good condition
4/26/16	9:15	-----	2/3/16	10:46	-----	-----	No sample collected, bag damaged, replaced
6/21/16	8:58	-----	4/26/16	9:15	-----	-----	No sample collected, bag damaged, replaced
8/11/16	8:47	4.75	6/21/16	8:58	51.0	0.35	Sample collected, bag in good condition
10/25/16	12:51	6.75	8/11/16	8:47	75.2	0.33	Sample collected, bag in good condition
				Mean Value:		**0.54**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 3

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	10:23	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:19	8.5	6/4/15	10:23	32.9	0.96	Measured volume, no sample collected
7/30/15	8:09	8	7/7/15	8:19	23.0	1.29	Sample collected, bag in good condition
8/28/15	10:35	8.75	7/30/15	8:09	29.1	1.11	Sample collected, bag in good condition
9/22/15	10:05	11.5	8/28/15	10:35	25.0	1.71	Sample collected, bag in good condition
12/15/15	10:24	-----	9/22/15	10:05	-----	-----	No sample collected, bag damaged, replaced
2/3/16	10:55	8.75	12/15/15	10:24	50.0	0.65	Sample collected, bag in good condition
4/26/16	9:24	-----	2/3/16	10:55	-----	-----	No sample collected, bag damaged, replaced
6/21/16	9:05	-----	4/26/16	9:24	-----	-----	No sample collected, bag damaged, replaced
8/11/16	8:51	13.5	6/21/16	9:05	51.0	0.98	Sample collected, bag in good condition
10/25/16	13:52	12	8/11/16	8:51	75.2	0.59	Sample collected, bag in good condition
				Mean Value:		**0.92**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 3 - Without Sediments

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	10:22	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:17	6.5	6/9/15	10:22	27.9	0.86	Measured volume, no sample collected
7/30/15	8:12	17.5	7/7/15	8:17	23.0	2.82	Sample collected, bag replaced
8/28/15	10:40	33.25	7/30/15	8:12	29.1	4.23	Sample collected, bag in good condition
9/22/15	10:03	7.25	8/28/15	10:40	25.0	1.08	Sample collected, bag in good condition
12/15/15	10:26	3.5	9/22/15	10:03	84.0	0.15	Sample collected, bag in good condition
2/3/16	10:57	76.25	12/15/15	10:26	50.0	5.65	Sample collected, bag in good condition
4/26/16	9:22	11.75	2/3/16	10:57	82.9	0.52	Sample collected, bag in good condition
6/21/16	9:06	-----	4/26/16	9:22	-----	-----	No sample collected, bag damaged, replaced
8/11/16	8:56	18.25	6/21/16	9:06	51.0	1.33	Sample collected, bag in good condition
10/25/16	13:57	16.75	8/11/16	8:56	75.2	0.82	Sample collected, bag in good condition
				Mean Value:		**1.58**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 4

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	10:41	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:32	6.75	6/4/15	10:41	32.9	0.76	Measured volume, no sample collected
7/30/15	8:22	-----	7/7/15	8:32	-----	-----	Sample collected, bag in good condition
8/28/15	9:23	8.25	7/30/15	8:22	29.0	1.05	Sample collected, bag in good condition
9/22/15	10:14	5.25	8/28/15	9:23	25.0	0.78	Sample collected, bag in good condition
12/15/15	10:36	6.75	9/22/15	10:14	84.0	0.30	Sample collected, bag in good condition
2/3/16	11:06	3.25	12/15/15	10:36	50.0	0.24	Sample collected, bag in good condition
4/26/16	9:32	5.75	2/3/16	11:06	82.9	0.26	Sample collected, bag in good condition
6/21/16	9:12	5.5	4/26/16	9:32	56.0	0.36	Sample collected, bag in good condition
8/11/16	9:12	6.75	6/21/16	9:12	51.0	0.49	Sample collected, bag in good condition
10/25/16	19:16	7.5	8/11/16	9:12	75.4	0.37	Sample collected, bag in good condition
				Mean Value:		**0.42**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 5

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	10:57	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:45	12.5	6/4/15	10:57	32.9	1.41	Measured volume, no sample collected
7/30/15	8:34	10.5	7/7/15	8:45	23.0	1.69	Sample collected, bag replaced
8/28/15	9:35	13.5	7/30/15	8:34	29.0	1.72	Sample collected, bag replaced
9/22/15	10:25	10.5	8/28/15	9:35	25.0	1.55	Sample collected, bag in good condition
12/15/15	10:47	7.5	9/22/15	10:25	84.0	0.33	Sample collected, bag in good condition
2/3/16	11:16	17.5	12/15/15	10:47	50.0	1.30	Sample collected, bag in good condition
4/26/16	9:40	-----	2/3/16	11:16	-----	-----	No sample collected, bag damaged, replaced
6/21/16	9:22	-----	4/26/16	9:40	-----	-----	No sample collected, bag damaged, replaced
8/11/16	9:21	18.75	6/21/16	9:22	51.0	1.36	Sample collected, bag in good condition
10/25/16	20:17	19	8/11/16	9:21	75.5	0.93	Sample collected, bag in good condition
				Mean Value:		**1.10**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 6

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	11:09	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:51	21.5	6/4/15	11:09	32.9	2.42	Measured volume, no sample collected
7/30/15	8:40	17.5	7/7/15	8:51	23.0	2.82	Sample collected, bag replaced
8/28/15	9:40	-----	7/30/15	8:40	-----	-----	No sample collected, bag damaged, replaced
9/22/15	10:30	9.75	8/28/15	9:40	25.0	1.44	Sample collected, bag in good condition
12/15/15	10:55	10.5	9/22/15	10:30	84.0	0.46	Sample collected, bag in good condition
2/3/16	11:22	13	12/15/15	10:55	50.0	0.96	Sample collected, bag in good condition
4/26/16	9:46	14.25	2/3/16	11:22	82.9	0.64	Sample collected, bag in good condition
6/21/16	9:30	-----	4/26/16	9:46	-----	-----	No sample collected, bag damaged, replaced
8/11/16	9:29	20.25	6/21/16	9:30	51.0	1.47	Sample collected, bag in good condition
10/25/16	21:08	19.5	8/11/16	9:29	75.5	0.96	Sample collected, bag in good condition
				Mean Value:		**1.10**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 7

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	11:24	-----	-----	-----	-----	-----	Bags Installed
7/7/15	8:57	5.5	6/4/15	11:24	32.9	0.62	Measured volume, no sample collected
7/30/15	8:49	-----	7/7/15	8:57	-----	-----	No sample collected, bag damaged, replaced
8/28/15	9:44	13.5	7/30/15	8:49	29.0	1.72	Sample collected, bag in good condition
9/22/15	10:36	13.25	8/28/15	9:44	25.0	1.96	Sample collected, bag in good condition
12/15/15	11:04	6.5	9/22/15	10:36	84.0	0.29	Sample collected, bag in good condition
2/3/16	11:30	-----	12/15/15	11:04	-----	-----	No sample collected, meter damaged, repaired
4/26/16	9:54	-----	2/3/16	11:30	-----	-----	No sample collected, bag damaged, replaced
6/21/16	9:54	-----	4/26/16	9:54	-----	-----	No sample collected, bag damaged, replaced
8/11/16	9:36	6.5	6/21/16	9:54	51.0	0.47	Sample collected, bag in good condition
10/25/16	21:27	9	8/11/16	9:36	75.5	0.44	Sample collected, bag in good condition
				Mean Value:		**0.68**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 8

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	11:33	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:06	13.25	6/4/15	11:33	32.9	1.49	Measured volume, no sample collected
7/30/15	8:58	14.25	7/7/15	9:06	23.0	2.30	Sample collected, bag replaced
8/28/15	8:20	4.5	7/30/15	8:58	29.0	0.58	Sample collected, bag in good condition
9/22/15	10:45	13.25	8/28/15	8:20	25.1	1.96	Sample collected, bag in good condition
12/15/15	11:12	-----	9/22/15	10:45	-----	-----	No sample collected, bag damaged, replaced
2/3/16	11:39	6.75	12/15/15	11:12	50.0	0.50	Sample collected, bag in good condition
4/26/16	8:10	12.75	2/3/16	11:39	82.9	0.57	Sample collected, bag in good condition
6/21/16	7:50	11	4/26/16	8:10	56.0	0.73	Sample collected, bag in good condition
8/11/16	9:42	13.5	6/21/16	7:50	51.1	0.98	Sample collected, bag in good condition
10/25/16	23:04	13.75	8/11/16	9:42	75.6	0.67	Sample collected, bag in good condition
				Mean Value:		**0.90**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 9

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	9:00	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:14	7.5	6/9/15	9:00	28.0	0.99	Measured volume, no sample collected
7/30/15	9:07	-----	7/7/15	9:14	-----	-----	No sample collected, bag damaged, replaced
8/28/15	8:27	13.75	7/30/15	9:07	29.0	1.76	Sample collected, bag in good condition
9/22/15	10:54	7.25	8/28/15	8:27	25.1	1.07	Sample collected, bag in good condition
12/15/15	11:20	-----	9/22/15	10:54	-----	-----	No sample collected, bag missing, replaced
2/3/16	11:50	8.75	12/15/15	11:20	50.0	0.65	Sample collected, bag in good condition
4/26/16	8:25	7.5	2/3/16	11:50	82.9	0.34	Sample collected, bag in good condition
6/21/16	8:08	13	4/26/16	8:25	56.0	0.86	Sample collected, bag in good condition
8/11/16	9:50	13.75	6/21/16	8:08	51.1	1.00	Sample collected, bag in good condition
10/25/16	23:57	15	8/11/16	9:50	75.6	0.73	Sample collected, bag in good condition
				Mean Value:		**0.81**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 9 - Without Sediments

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	9:15	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:12	5.25	6/9/15	9:15	28.0	0.69	Measured volume, no sample collected
7/30/15	9:05	4.75	7/7/15	9:12	23.0	0.77	Sample collected, bag in good condition
8/28/15	8:25	6.25	7/30/15	9:05	29.0	0.80	Sample collected, bag in good condition
9/22/15	10:51	-----	8/28/15	8:25	-----	-----	No sample collected, bag missing, replaced
12/15/15	11:22	12.25	9/22/15	10:51	84.0	0.54	Sample collected, bag in good condition
2/3/16	11:47	3.5	12/15/15	11:22	50.0	0.26	Sample collected, bag in good condition
4/26/16	8:20	-----	2/3/16	11:47	-----	-----	No sample collected, bag missing, replaced
6/21/16	8:01	-----	4/26/16	8:20	-----	-----	No sample collected, bag missing, replaced
8/11/16	9:54	10.5	6/21/16	8:01	51.1	0.76	Sample collected, bag in good condition
10/25/16	10:02	13	8/11/16	9:54	75.0	0.64	Sample collected, bag in good condition
				Mean Value:		**0.60**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 10

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	11:52	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:21	15	6/4/15	11:52	32.9	1.69	Measured volume, no sample collected
7/30/15	9:18	11.25	7/7/15	9:21	23.0	1.81	Sample collected, bag in good condition
8/28/15	8:34	-----	7/30/15	9:18	-----	-----	No sample collected, meter missing, replaced
9/22/15	11:03	10.5	8/28/15	8:34	25.1	1.55	Sample collected, bag in good condition
12/15/15	11:30	-----	9/22/15	11:03	-----	-----	No sample collected, meter missing, replaced
2/3/16	9:59	-----	12/15/15	11:30	-----	-----	No sample collected, meter missing, replaced
4/26/16	8:34	12	2/3/16	9:59	82.9	0.54	Sample collected, bag in good condition
6/21/16	8:14	10	4/26/16	8:34	56.0	0.66	Sample collected, bag in good condition
8/11/16	8:10	13.25	6/21/16	8:14	51.0	0.96	Sample collected, bag in good condition
10/25/16	8:08	10.25	8/11/16	8:10	75.0	0.51	Sample collected, bag in good condition
				Mean Value:		**0.88**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 11

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/4/15	12:00	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:28	24	6/4/15	12:00	32.9	2.70	Measured volume, no sample collected
7/30/15	9:25	-----	7/7/15	9:28	-----	-----	No sample collected, bag damaged, replaced
8/28/15	8:41	-----	7/30/15	9:25	-----	-----	No sample collected, meter missing, replaced
9/22/15	11:13	42.75	8/28/15	8:41	25.1	6.31	Sample collected, bag in good condition
12/15/15	11:40	-----	9/22/15	11:13	-----	-----	No sample collected, meter missing, replaced
2/3/16	10:08	-----	12/15/15	11:40	-----	-----	No sample collected, meter missing, replaced
4/26/16	8:41	12	2/3/16	10:08	82.9	0.54	Sample collected, bag in good condition
6/21/16	8:21	10.25	4/26/16	8:41	56.0	0.68	Sample collected, bag in good condition
8/11/16	8:19	11.5	6/21/16	8:21	51.0	0.84	Sample collected, bag in good condition
10/25/16	9:45	10.25	8/11/16	8:19	75.1	0.51	Sample collected, bag in good condition
				Mean Value:		**1.27**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 12

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	8:52	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:36	17.25	6/9/15	8:52	28.0	2.28	Measured volume, no sample collected
7/30/15	9:34	11.5	7/7/15	9:36	23.0	1.85	Sample collected, bag in good condition
8/28/15	8:49	10.25	7/30/15	9:34	29.0	1.31	Sample collected, bag in good condition
9/22/15	11:39	6.5	8/28/15	8:49	25.1	0.96	Sample collected, bag in good condition
12/15/15	11:50	10.25	9/22/15	11:39	84.0	0.45	Sample collected, bag in good condition
2/3/16	10:20	2.75	12/15/15	11:50	49.9	0.20	Sample collected, bag in good condition
4/26/16	8:51	24	2/3/16	10:20	82.9	1.07	Sample collected, bag in good condition
6/21/16	8:33	17	4/26/16	8:51	56.0	1.12	Sample collected, bag in good condition
8/11/16	8:27	-----	6/21/16	8:33	-----	-----	No sample collected, meter flipped, reinstalled
10/25/16	11:38	13.25	8/11/16	8:27	75.1	0.65	Sample collected, bag in good condition
				Mean Value:		**0.92**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 13

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	8:34	-----	-----	-----	-----	-----	Bags Installed
7/7/15	9:53	14.5	6/9/15	8:34	28.1	1.91	Measured volume, no sample collected
7/30/15	9:43	18.25	7/7/15	9:53	23.0	2.94	Sample collected, bag replaced
8/28/15	8:57	10.5	7/30/15	9:43	29.0	1.34	Sample collected, bag in good condition
9/22/15	9:37	-----	8/28/15	8:57	-----	-----	No sample collected, bag damaged, replaced
12/15/15	10:05	-----	9/22/15	9:37	-----	-----	No sample collected, meter flipped, reinstalled
2/3/16	10:33	2.5	12/15/15	10:05	50.0	0.19	Sample collected, bag in good condition
4/26/16	9:00	-----	2/3/16	10:33	-----	-----	No sample collected, meter flipped, reinstalled
6/21/16	8:39	-----	4/26/16	9:00	-----	-----	No sample collected, meter flipped, reinstalled
8/11/16	8:33	9.25	6/21/16	8:39	51.0	0.67	Sample collected, bag in good condition
10/25/16	11:45	8.5	8/11/16	8:33	75.1	0.42	Sample collected, bag in good condition
				Mean Value:		**0.92**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 14

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	10:40	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:54	13.25	6/9/15	10:40	28.0	1.75	Measured volume, no sample collected
7/30/15	9:53	4.25	7/7/15	10:54	23.0	0.69	Sample collected, bag in good condition
8/28/15	10:30	10.75	7/30/15	9:53	29.0	1.37	Sample collected, bag in good condition
9/23/15	8:55	9.25	8/28/15	10:30	25.9	1.32	Sample collected, bag in good condition
12/15/15	11:57	-----	9/23/15	8:55	-----	-----	No sample collected, meter missing, replaced
2/3/16	9:51	-----	12/15/15	11:57	-----	-----	No sample collected, meter missing, replaced
4/26/16	9:17	-----	2/3/16	9:51	-----	-----	No sample collected, meter missing
				Mean Value:		**1.31**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 15

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/11/15	9:05	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:45	5.25	6/11/15	9:05	26.1	0.75	Measured volume, no sample collected
7/30/15	10:02	5.75	7/7/15	10:45	23.0	0.93	Sample collected, bag in good condition
8/28/15	10:22	13.25	7/30/15	10:02	29.0	1.69	Sample collected, bag in good condition
9/23/15	9:12	3.75	8/28/15	10:22	26.0	0.54	Sample collected, bag in good condition
12/15/15	12:07	-----	9/23/15	9:12	-----	-----	No sample collected, meter missing, replaced
2/3/16	9:46	-----	12/15/15	12:07	-----	-----	No sample collected, can't find meter
4/26/16	9:30	-----	2/3/16	9:46	-----	-----	No sample collected, meter missing, replaced
6/21/16	9:08	-----	4/26/16	9:30	-----	-----	No sample collected, meter missing, replaced
8/11/16	10:20	5.5	6/21/16	9:08	51.0	0.40	Sample collected, bag in good condition
10/25/16	12:05	6	8/11/16	10:20	75.1	0.30	Sample collected, bag in good condition
				Mean Value:		**0.64**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 15 - Without Sediments

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/11/15	8:50	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:49	2.75	6/11/15	8:50	26.1	0.39	Measured volume, no sample collected
7/30/15	9:58	3.25	7/7/15	10:49	23.0	0.52	Sample collected, bag in good condition
8/28/15	10:20	3.5	7/30/15	9:58	29.0	0.45	Sample collected, bag in good condition
9/23/15	9:09	4.25	8/28/15	10:20	26.0	0.61	Sample collected, bag in good condition
12/15/15	12:04	6.25	9/23/15	9:09	83.1	0.28	Sample collected, bag in good condition
2/3/16	9:45	-----	12/15/15	12:04	-----	-----	No sample collected, meter missing, replaced
4/26/16	9:30	-----	2/3/16	9:45	-----	-----	No sample collected, meter missing
				Mean Value:		**0.40**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 16

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/11/15	9:40	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:30	13.5	6/11/15	9:40	26.0	1.92	Measured volume, no sample collected
7/30/15	10:12	1.25	7/7/15	10:30	23.0	0.20	Sample collected, bag in good condition
8/28/15	10:13	4.25	7/30/15	10:12	29.0	0.54	Sample collected, bag in good condition
9/23/15	9:22	3.25	8/28/15	10:13	26.0	0.46	Sample collected, bag in good condition
12/15/15	12:16	5.75	9/23/15	9:22	83.1	0.26	Sample collected, bag in good condition
2/3/16	9:42	-----	12/15/15	12:16	-----	-----	No sample collected, meter missing, replaced
4/26/16	9:37	-----	2/3/16	9:42	-----	-----	No sample collected, meter missing
				Mean Value:		**0.55**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 16 - Without Sediments

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/11/15	9:30	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:26	2.75	6/11/15	9:30	26.0	0.39	Measured volume, no sample collected
7/30/15	10:09	2.25	7/7/15	10:26	23.0	0.36	Sample collected, bag in good condition
8/28/15	10:10	2.5	7/30/15	10:09	29.0	0.32	Sample collected, bag in good condition
9/23/15	9:19	1.75	8/28/15	10:10	26.0	0.25	Sample collected, bag in good condition
12/15/15	12:13	1.5	9/23/15	9:19	83.1	0.07	Sample collected, bag in good condition
2/3/16	9:41	-----	12/15/15	12:13	-----	-----	No sample collected, meter missing, replaced
4/26/16	9:36	-----	2/3/16	9:41	-----	-----	No sample collected, meter missing
				Mean Value:		**0.21**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 17

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/17/15	11:20	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:12	7.5	6/17/15	11:20	20.0	1.39	Measured volume, no sample collected
7/30/15	10:32	7.5	7/7/15	10:12	23.0	1.21	Sample collected, bag in good condition
8/28/15	9:52	10.25	7/30/15	10:32	29.0	1.31	Sample collected, bag in good condition
9/23/15	9:46	1.5	8/28/15	9:52	26.0	0.21	Sample collected, bag in good condition
12/15/15	12:19	-----	9/23/15	9:46	-----	-----	No sample collected, meter missing, replaced
2/3/16	9:31	-----	12/15/15	12:19	-----	-----	No sample collected, meter missing, replaced
4/26/16	8:31	-----	2/3/16	9:31	-----	-----	No sample collected, meter missing
				Mean Value:		**1.01**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 17 - Without Sediments

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/17/15	11:00	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:12	11.25	6/17/15	11:00	20.0	2.09	Measured volume, no sample collected
7/30/15	10:29	0.6	7/7/15	10:12	23.0	0.10	Sample collected, bag in good condition
8/28/15	9:56	2	7/30/15	10:29	29.0	0.26	Sample collected, bag in good condition
9/23/15	9:43	2.5	8/28/15	9:56	26.0	0.36	Sample collected, bag in good condition
12/15/15	12:19	-----	9/23/15	9:43	-----	-----	No sample collected, meter missing, replaced
2/3/16	9:31	-----	12/15/15	12:19	-----	-----	No sample collected, meter missing, replaced
4/26/16	8:31	-----	2/3/16	9:31	-----	-----	No sample collected, meter missing
				Mean Value:		**0.62**	

Seepage Meter Field Measurements

Location: Lake Yale **Site:** 18

Date Installed: 6/4/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
6/9/15	9:50	-----	-----	-----	-----	-----	Bags Installed
7/7/15	10:21	4.25	6/9/15	9:50	28.0	0.56	Measured volume, no sample collected
7/30/15	10:21	-----	7/7/15	10:21	-----	-----	No sample collected, bag damaged, replaced
8/28/15	10:00	-----	7/30/15	10:21	-----	-----	No sample collected, can't find meter
9/23/15	9:34	-----	8/28/15	10:00	-----	-----	No sample collected, meter missing, replaced
12/15/15	12:22	-----	9/23/15	9:34	-----	-----	No sample collected, meter missing, replaced
2/3/16	9:35	-----	12/15/15	12:22	-----	-----	No sample collected, meter missing, replaced
4/26/16	8:33	-----	2/3/16	9:35	-----	-----	No sample collected, meter missing
					Mean Value:	**0.56**	

G.2 Trout Lake

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 1

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	9:55	-----	-----	-----	-----	-----	Bags Installed
7/7/15	12:00	10.25	5/22/15	9:55	46.1	0.82	Measured volume, no sample collected
7/29/15	11:10	8.25	7/7/15	12:00	22.0	1.39	Sample collected, bag in good condition
8/27/15	9:08	7.5	7/29/15	11:10	28.9	0.96	Sample collected, bag in good condition
9/23/15	10:25	12.5	8/27/15	9:08	27.1	1.71	Sample collected, bag in good condition
12/15/15	13:07	11.5	9/23/15	10:25	83.1	0.51	Sample collected, bag in good condition
2/3/16	12:40	4.75	12/15/15	13:07	50.0	0.35	Sample collected, bag in good condition
4/26/16	10:42	12.75	2/3/16	12:40	82.9	0.57	Sample collected, bag in good condition
6/21/16	12:38	11.5	4/26/16	10:42	56.1	0.76	Sample collected, bag in good condition
8/11/16	11:08	10.25	6/21/16	12:38	50.9	0.75	Sample collected, bag in good condition
10/28/16	7:55	8.75	8/11/16	11:08	77.9	0.42	Sample collected, bag in good condition
				Mean Value:		**0.69**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 2

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	10:09	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:48	10.5	5/22/15	10:09	46.1	0.84	Measured volume, no sample collected
7/29/15	11:03	6.5	7/7/15	11:48	22.0	1.10	Sample collected, bag in good condition
8/27/15	8:49	16.5	7/29/15	11:03	28.9	2.11	Sample collected, bag in good condition
9/23/15	10:31	7.25	8/27/15	8:49	27.1	0.99	Sample collected, bag in good condition
12/15/15	13:12	8.75	9/23/15	10:31	83.1	0.39	Sample collected, bag in good condition
2/3/16	12:45	15.5	12/15/15	13:12	50.0	1.15	Sample collected, bag in good condition
4/26/16	10:46	9	2/3/16	12:45	82.9	0.40	Sample collected, bag in good condition
6/21/16	12:42	12.75	4/26/16	10:46	56.1	0.84	Sample collected, bag in good condition
8/11/16	11:13	11.5	6/21/16	12:42	50.9	0.84	Sample collected, bag in good condition
10/28/16	8:01	12	8/11/16	11:13	77.9	0.57	Sample collected, bag in good condition
				Mean Value:		**0.78**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 3

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	10:17	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:45	10.75	5/22/15	10:17	46.1	0.86	Measured volume, no sample collected
7/29/15	10:59	5.25	7/7/15	11:45	22.0	0.89	Sample collected, bag in good condition
8/27/15	8:57	3.75	7/29/15	10:59	28.9	0.48	Sample collected, bag in good condition
9/23/15	10:48	7.25	8/27/15	8:57	27.1	0.99	Sample collected, bag in good condition
12/15/15	13:26	8.5	9/23/15	10:48	83.1	0.38	Sample collected, bag in good condition
2/3/16	13:41	4.5	12/15/15	13:26	50.0	0.33	Sample collected, bag in good condition
4/26/16	11:00	16	2/3/16	13:41	82.9	0.71	Sample collected, bag in good condition
6/21/16	13:00	13.25	4/26/16	11:00	56.1	0.88	Sample collected, bag in good condition
8/11/16	11:29	12.5	6/21/16	13:00	50.9	0.91	Sample collected, bag in good condition
10/28/16	8:07	8.75	8/11/16	11:29	77.9	0.42	Sample collected, bag in good condition
				Mean Value:		**0.64**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 4

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	10:51	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:30	22.5	5/22/15	10:51	46.0	1.81	Measured volume, no sample collected
7/29/15	10:51	13.5	7/7/15	11:30	22.0	2.28	Sample collected, bag in good condition
8/27/15	9:04	30.25	7/29/15	10:51	28.9	3.87	Sample collected, bag in good condition
9/23/15	11:07	10.25	8/27/15	9:04	27.1	1.40	Sample collected, bag in good condition
12/15/15	13:44	-----	9/23/15	11:07	-----	-----	No sample collected, bag damaged, replaced
2/3/16	13:16	6.75	12/15/15	13:44	50.0	0.50	Sample collected, bag in good condition
4/26/16	11:16	6.25	2/3/16	13:16	82.9	0.28	Sample collected, bag in good condition
6/21/16	13:18	18.75	4/26/16	11:16	56.1	1.24	Sample collected, bag in good condition
8/11/16	11:48	22.5	6/21/16	13:18	50.9	1.64	Sample collected, bag in good condition
10/28/16	8:18	18	8/11/16	11:48	77.9	0.86	Sample collected, bag in good condition
				Mean Value:		**1.25**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 4 - Without Sediments

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	10:47	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:32	5.25	5/22/15	10:47	46.0	0.42	Measured volume, no sample collected
7/29/15	10:48	3.25	7/7/15	11:32	22.0	0.55	Sample collected, bag in good condition
8/27/15	9:02	3.75	7/29/15	10:48	28.9	0.48	Sample collected, bag in good condition
9/23/15	11:05	7.5	8/27/15	9:02	27.1	1.03	Sample collected, bag in good condition
12/15/15	13:40	4.75	9/23/15	11:05	83.1	0.21	Sample collected, bag in good condition
2/3/16	13:13	5.25	12/15/15	13:40	50.0	0.39	Sample collected, bag in good condition
4/26/16	11:12	9.75	2/3/16	13:13	82.9	0.44	Sample collected, bag in good condition
6/21/16	13:13	6.75	4/26/16	11:12	56.1	0.45	Sample collected, bag in good condition
8/11/16	11:43	5.25	6/21/16	13:13	50.9	0.38	Sample collected, bag in good condition
10/28/16	8:26	5.5	8/11/16	11:43	77.9	0.26	No sample collected, meter flipped
				Mean Value:		**0.40**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 5

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	11:45	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:39	26.5	5/22/15	11:45	46.0	2.13	Measured volume, no sample collected
7/29/15	11:29	6.75	7/7/15	11:39	22.0	1.14	Sample collected, bag in good condition
8/27/15	9:20	7.5	7/29/15	11:29	28.9	0.96	Sample collected, bag in good condition
9/23/15	9:11	6.5	8/27/15	9:20	27.0	0.89	Sample collected, bag in good condition
12/15/15	9:50	2.5	9/23/15	9:11	83.0	0.11	Sample collected, bag in good condition
2/3/16	10:48	3.75	12/15/15	9:50	50.0	0.28	Sample collected, bag in good condition
4/26/16	11:24	9.5	2/3/16	10:48	83.0	0.42	Sample collected, bag in good condition
6/21/16	10:47	13.5	4/26/16	11:24	56.0	0.89	Sample collected, bag in good condition
8/11/16	10:25	14	6/21/16	10:47	51.0	1.02	Sample collected, bag in good condition
10/28/16	9:30	10.25	8/11/16	10:25	78.0	0.49	Sample collected, bag in good condition
				Mean Value:		**0.71**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 5 - Without Sediments

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	11:43	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:37	3.25	5/22/15	11:43	46.0	0.26	Measured volume, no sample collected
7/29/15	11:24	3.5	7/7/15	11:37	22.0	0.59	Sample collected, bag in good condition
8/27/15	9:17	3.25	7/29/15	11:24	28.9	0.42	Sample collected, bag in good condition
9/23/15	10:55	1.5	8/27/15	9:17	27.1	0.21	Sample collected, bag in good condition
12/15/15	13:32	2.5	9/23/15	10:55	83.1	0.11	Sample collected, bag in good condition
2/3/16	13:06	5.5	12/15/15	13:32	50.0	0.41	Sample collected, bag in good condition
4/26/16	11:05	1.5	2/3/16	13:06	82.9	0.07	Sample collected, bag in good condition
6/21/16	10:53	3	4/26/16	11:05	56.0	0.20	Sample collected, bag in good condition
8/11/16	11:37	3.5	6/21/16	10:53	51.0	0.25	Sample collected, bag in good condition
10/28/16	8:42	5.5	8/11/16	11:37	77.9	0.26	Sample collected, bag in good condition
				Mean Value:		**0.23**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 6

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	12:28	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:53	29.25	5/22/15	12:28	46.0	2.36	Measured volume, no sample collected
7/29/15	11:14	13.25	7/7/15	11:53	22.0	2.23	Sample collected, bag in good condition
8/27/15	9:29	12.95	7/29/15	11:14	28.9	1.66	Sample collected, bag in good condition
9/23/15	10:44	7.25	8/27/15	9:29	27.1	0.99	Sample collected, bag in good condition
12/15/15	13:23	5.25	9/23/15	10:44	83.1	0.23	Sample collected, bag in good condition
2/3/16	12:55	6.5	12/15/15	13:23	50.0	0.48	Sample collected, bag in good condition
4/26/16	10:55	-----	2/3/16	12:55	-----	-----	No sample collected, meter flipped, reinstalled
6/21/16	10:34	22.75	4/26/16	10:55	56.0	1.51	Sample collected, bag in good condition
8/11/16	11:28	24.5	6/21/16	10:34	51.0	1.78	Sample collected, bag in good condition
10/28/16	8:57	15	8/11/16	11:28	77.9	0.71	Sample collected, bag in good condition
				Mean Value:		**1.15**	

Seepage Meter Field Measurements

Location: Trout Lake **Site:** 6 - Without Sediments

Date Installed: 5/22/15 **Chamber Diameter:** 0.58 m **Sediment Area Covered:** 0.27 m^2

Date	Time Collected	Volume Collected (liters)	Previous Collection Event		Seepage Time (days)	Seepage (liters/m^2-day)	Comments / Observations
			Date	Time			
5/22/15	12:20	-----	-----	-----	-----	-----	Bags Installed
7/7/15	11:55	16.5	5/22/15	12:20	46.0	1.33	Measured volume, no sample collected
7/29/15	11:10	6.75	7/7/15	11:55	22.0	1.14	Sample collected, bag in good condition
8/27/15	9:25	6.5	7/29/15	11:10	28.9	0.83	Sample collected, bag in good condition
9/23/15	10:40	3.25	8/27/15	9:25	27.1	0.44	Sample collected, bag in good condition
12/15/15	13:20	3.5	9/23/15	10:40	83.1	0.16	Sample collected, bag in good condition
2/3/16	12:49	3.25	12/15/15	13:20	50.0	0.24	Sample collected, bag in good condition
4/26/16	10:51	4.75	2/3/16	12:49	82.9	0.21	Sample collected, bag in good condition
6/21/16	10:42	16.25	4/26/16	10:51	56.0	1.07	Sample collected, bag in good condition
8/11/16	11:23	10	6/21/16	10:42	51.0	0.73	Sample collected, bag in good condition
10/28/16	9:04	9.5	8/11/16	11:23	77.9	0.45	Sample collected, bag in good condition
				Mean Value:		**0.57**	

APPENDIX H

CHARACTERISTICS OF INFLOW / OUTFLOW SAMPLES COLLECTED AT LAKE YALE AND TROUT LAKE

H.1 Lake Yale
H.2 Trout Lake

H.1 Lake Yale

Characteristics of Inflow Samples Entering Lake Yale from March 2015 - June 2016

Lab ID	Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/l)	Cond. (µmho/cm)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)
15-639	Yale	Inflow #1	3/26/15	6.63	23.0	138	197	448	526	280	1,450	296	18	57	371	2.8	336	5.4
15-1048	Yale	Inflow #1	5/28/15	7.14	102.0	293	2	17	669	103	791	137	151	50	338	4.7	72	7.4
15-1517	Yale	Inflow #1	7/31/15	7.34	77.6	239	37	3	661	138	839	471	36	68	575	2.6	117	2.6
15-1580	Yale	Inflow #1	8/11/15	7.29	88.8	251	57	3	649	158	867	395	17	341	753	7.1	125	8.4
15-1704	Yale	Inflow #1	8/24/15	6.69	67.4	216	12	3	639	84	738	125	31	50	207	1.8	98	2.2
15-1938	Yale	Inflow #1	9/17/15	6.77	67.6	198	13	5	667	164	849	253	11	36	300	1.7	158	2.0
15-2577	Yale	Inflow #1	11/24/15	6.98	83.4	231	64	3	585	67	719	160	18	29	206	3.1	87	1.1
15-2801	Yale	Inflow #1	12/10/15	7.01	83.2	240	17	6	661	160	844	137	97	85	319	3.7	73	2.7
15-2992	Yale	Inflow #1	12/23/15	6.59	79.8	188	17	3	597	54	671	113	7	85	205	4.4	65	2.7
16-30	Yale	Inflow #1	1/5/16	7.14	82.8	228	55	3	381	17	456	94	9	23	126	2.3	59	1.2
16-163	Yale	Inflow #1	1/18/16	7.31	74.0	214	22	9	381	21	432	97	12	20	129	1.0	49	1.4
16-313	Yale	Inflow #1	1/28/16	7.09	62.0	200	22	5	376	87	490	93	17	18	128	2.3	66	1.1
16-594	Yale	Inflow #1	3/2/16	7.04	79.6	246	20	11	581	79	691	175	11	38	224	1.3	93	0.9
16-829	Yale	Inflow #1	3/29/16	6.80	79.6	239	22	50	435	79	586	455	25	30	510	1.1	90	1.7
16-914	Yale	Inflow #1	4/12/16	6.93	85.1	259	3	29	606	43	681	129	94	51	274	1.9	107	4.1
16-1439	Yale	Inflow #1	5/19/16	7.02	86.0	142	5	3	362	54	424	363	7	54	424	2.8	88	4.3
16-1657	Yale	Inflow #1	6/9/16	6.69	88.6	176	12	3	577	42	634	438	71	96	605	3.4	97	5.1
Lake Yale Inflow - Site 1	**Minimum Value:**			**6.59**	**23.0**	**138**	**2**	**3**	**362**	**17**	**424**	**93**	**7**	**18**	**126**	**1.0**	**49**	**0.9**
	Maximum Value:			**7.34**	**102.0**	**293**	**197**	**448**	**669**	**280**	**1,450**	**471**	**151**	**341**	**753**	**7.1**	**336**	**8.4**
	Arithmetic Value:			**6.97**	**77.1**	**218**	**34**	**35**	**550**	**96**	**715**	**231**	**37**	**67**	**335**	**2.8**	**105**	**3.2**
	Geometric Mean:			**6.96**	**74.3**	**214**	**19**	**8**	**537**	**76**	**683**	**194**	**23**	**49**	**291**	**2.5**	**94**	**2.5**
15-1518	Yale	Inflow #2	7/31/15	6.10	30.0	152	189	12	2,491	1,171	3,862	284	124	78	486	4.7	769	20.3
15-1581	Yale	Inflow #2	8/11/15	6.05	31.6	213	277	20	2,423	523	3,242	153	40	153	346	7.8	656	17.0
15-1705	Yale	Inflow #2	8/24/15	6.07	19.6	125	41	3	1,280	286	1,609	22	18	84	123	10.1	225	12.2
15-1939	Yale	Inflow #2	9/17/15	5.98	18.6	111	33	16	1,377	425	1,850	61	26	97	184	7.4	280	15.0
15-2578	Yale	Inflow #2	11/24/15	5.99	29.2	183	33	607	1,254	205	2,099	218	32	14	264	7.9	483	9.8
16-164	Yale	Inflow #2	1/18/16	5.88	16.4	178	28	3	1,854	310	2,195	29	15	21	65	4.7	318	8.3
16-314	Yale	Inflow #2	1/28/16	6.05	11.6	129	12	3	1,143	126	1,284	12	22	13	47	3.6	234	7.2
16-830	Yale	Inflow #2	3/29/16	5.82	32.4	190	33	35	2,095	563	2,726	22	67	100	189	6.3	619	14.3
Lake Yale Inflow - Site 2	**Minimum Value:**			**5.82**	**11.6**	**111**	**12**	**3**	**1,143**	**126**	**1,284**	**12**	**15**	**13**	**47**	**3.6**	**225**	**7.2**
	Maximum Value:			**6.10**	**32.4**	**213**	**277**	**607**	**2,491**	**1,171**	**3,862**	**284**	**124**	**153**	**486**	**10.1**	**769**	**20.3**
	Arithmetic Value:			**5.99**	**23.7**	**160**	**81**	**87**	**1,739**	**451**	**2,358**	**100**	**43**	**70**	**213**	**6.6**	**448**	**13.0**
	Geometric Mean:			**5.99**	**22.3**	**156**	**47**	**15**	**1,665**	**368**	**2,225**	**56**	**34**	**50**	**166**	**6.2**	**404**	**12.3**
16-315	Yale	Inflow #6	1/28/16	7.55	262	1,253	10	3	1,201	128	1,342	1,780	1,562	4,963	8,305	4.9	266	1.6
Lake Yale Inflow - Site 6	**Minimum Value:**			**7.55**	**262**	**1,253**	**10**	**3**	**1,201**	**128**	**1,342**	**1,780**	**1,562**	**4,963**	**8,305**	**4.9**	**266**	**1.6**
	Maximum Value:			**7.55**	**262**	**1,253**	**10**	**3**	**1,201**	**128**	**1,342**	**1,780**	**1,562**	**4,963**	**8,305**	**4.9**	**266**	**1.6**
	Arithmetic Value:			**7.55**	**262**	**1,253**	**10**	**3**	**1,201**	**128**	**1,342**	**1,780**	**1,562**	**4,963**	**8,305**	**4.9**	**266**	**1.6**
	Geometric Mean:			**7.55**	**262**	**1,253**	**10**	**3**	**1,201**	**128**	**1,342**	**1,780**	**1,562**	**4,963**	**8,305**	**4.9**	**266**	**1.6**

H.2 Trout Lake

Characteristics of Inflow Samples Entering Trout Lake from March 2015 - June 2016

Lab ID	Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/l)	Cond. (µmho/cm)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)
15-1707	Trout	Inflow #1	8/24/15	5.34	4.2	95	144	5	1,040	173	1,362	97	49	12	158	4.1	336	1.8
15-1941	Trout	Inflow #1	9/17/15	5.39	3.4	90	60	7	1,053	220	1,339	148	16	21	185	2.4	405	5.2
16-833	Trout	Inflow #1	3/29/16	5.63	13.8	199	12	25	771	285	1,093	78	39	27	144	1.6	371	4.3
16-316	Trout	Inflow #1	1/28/16	6.15	12.6	98	8	3	617	195	823	43	27	13	83	5.1	223	5.9
Trout Lake Inflow - Site 1	**Minimum Value:**			**5.34**	**3.4**	**90**	**8**	**3**	**617**	**173**	**823**	**43**	**16**	**12**	**83**	**1.6**	**223**	**1.8**
	Maximum Value:			**6.15**	**13.8**	**199**	**144**	**25**	**1,053**	**285**	**1,362**	**148**	**49**	**27**	**185**	**5.1**	**405**	**5.9**
	Arithmetic Value:			**5.63**	**8.5**	**121**	**56**	**10**	**870**	**218**	**1,154**	**92**	**33**	**18**	**143**	**3.3**	**334**	**4.3**
	Geometric Mean:			**5.62**	**7.1**	**114**	**30**	**7**	**850**	**214**	**1,132**	**83**	**30**	**17**	**137**	**3.0**	**326**	**3.9**
16-317	Trout	Inflow #3	1/28/16	6.73	20.0	123	20	3	541	27	591	4	24	4	32	1.8	219	1.6
Trout Lake Inflow - Site 3	**Minimum Value:**			**6.73**	**20.0**	**123**	**20**	**3**	**541**	**27**	**591**	**4**	**24**	**4**	**32**	**1.8**	**219**	**1.6**
	Maximum Value:			**6.73**	**20.0**	**123**	**20**	**3**	**541**	**27**	**591**	**4**	**24**	**4**	**32**	**1.8**	**219**	**1.6**
	Arithmetic Value:			**6.73**	**20.0**	**123**	**20**	**3**	**541**	**27**	**591**	**4**	**24**	**4**	**32**	**1.8**	**219**	**1.6**
	Geometric Mean:			**6.73**	**20.0**	**123**	**20**	**3**	**541**	**27**	**591**	**4**	**24**	**4**	**32**	**1.8**	**219**	**1.6**
15-1519	Trout	Hicks Ditch	7/31/15	6.59	25.0	112	87	3	1,734	47	1,871	157	56	47	260	4.0	340	6.8
15-1659	Trout	Hicks Ditch	6/9/16	5.85	28.4	147	156	3	1,236	42	1,437	134	34	40	208	2.7	268	9.8
15-1706	Trout	Hicks Ditch	8/24/15	6.04	17.0	101	32	47	1,218	29	1,326	169	65	54	288	8.3	319	7.8
15-1940	Trout	Hicks Ditch	9/17/15	6.14	22.0	92	69	22	1,257	88	1,436	267	10	19	296	30.3	322	15.6
15-2239	Trout	Hicks Ditch	10/15/15	5.82	13.0	104	61	3	1,149	221	1,434	25	69	40	134	2.4	306	3.3
15-2260	Trout	Hicks Ditch	10/22/15	6.02	29.8	144	32	3	1,061	121	1,217	28	16	25	69	3.0	318	4.7
15-2383	Trout	Hicks Ditch	11/4/15	6.02	16.6	120	72	3	1,165	208	1,448	10	9	16	35	1.2	320	9.4
15-2580	Trout	Hicks Ditch	11/24/15	5.83	17.2	123	48	3	1,521	139	1,710	22	20	34	77	5.6	368	17.2
15-2803	Trout	Hicks Ditch	12/10/15	6.16	19.4	139	28	16	1,563	217	1,824	22	70	30	122	1.6	317	4.1
15-2994	Trout	Hicks Ditch	12/23/15	5.76	17.4	109	61	3	1,475	85	1,624	14	28	20	62	1.9	324	4.4
16-32	Trout	Hicks Ditch	1/5/16	6.15	17.2	131	71	4	1,146	106	1,326	7	25	23	55	1.1	286	2.0
16-166	Trout	Hicks Ditch	1/18/126	6.10	15.4	128	118	24	1,074	101	1,317	89	10	5	104	1.8	233	1.8
16-319	Trout	Hicks Ditch	1/28/16	6.12	13.6	112	42	38	824	73	976	203	10	21	234	5.1	209	2.1
16-595	Trout	Hicks Ditch	3/2/16	6.46	30.4	161	30	34	990	78	1,133	39	16	5	60	2.8	263	1.7
16-773	Trout	Hicks Ditch	3/17/16	5.41	12.0	137	29	3	1,293	57	1,382	18	26	9	53	2.3	332	8.7
16-1831	Trout	Hicks Ditch	3/29/16	5.86	27.0	138	110	34	882	90	1,116	29	30	2	61	4.2	240	8.2
16-915	Trout	Hicks Ditch	4/12/16	5.91	29.2	140	21	5	1,129	192	1,347	16	15	19	50	1.4	172	2.9
Trout Lake Inflow - Hicks Ditch Site	**Minimum Value:**			**5.41**	**12.0**	**92**	**21**	**3**	**824**	**29**	**976**	**7**	**9**	**2**	**35**	**1.1**	**172**	**1.7**
	Maximum Value:			**6.59**	**30.4**	**161**	**156**	**47**	**1,734**	**221**	**1,871**	**267**	**70**	**54**	**296**	**30.3**	**368**	**17.2**
	Arithmetic Value:			**6.01**	**20.6**	**126**	**63**	**15**	**1,219**	**111**	**1,407**	**73**	**30**	**24**	**128**	**4.7**	**290**	**6.5**
	Geometric Mean:			**6.01**	**19.7**	**124**	**53**	**8**	**1,196**	**95**	**1,388**	**40**	**24**	**18**	**101**	**3.0**	**285**	**5.1**

Characteristics of Inflow Samples Entering Trout Lake from March 2015 - June 2016

Lab ID	Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/l)	Cond. (µmho/cm)	Ammonia (µg/L)	NO_X (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Turbidity (NTU)	Color (Pt-Co)	TSS (mg/l)
15-1708	Trout	Nature Center	8/24/15	6.82	42.8	108	17	3	597	132	749	18	9	26	53	3.9	155	6.4
15-1942	Trout	Nature Center	9/17/15	6.63	50.6	121	16	24	594	237	871	67	3	8	78	6.9	133	7.8
16-318	Trout	Nature Center	1/28/16	6.96	40.0	111	3	3	301	85	392	6	23	6	35	3.1	83	1.7
Trout Lake Inflow - Nature Center	**Minimum Value:**			**6.63**	**40.0**	**108**	**3**	**3**	**301**	**85**	**392**	**6**	**3**	**6**	**35**	**3.1**	**83**	**1.7**
	Maximum Value:			**6.96**	**50.6**	**121**	**17**	**24**	**597**	**237**	**871**	**67**	**23**	**26**	**78**	**6.9**	**155**	**7.8**
	Arithmetic Value:			**6.80**	**44.5**	**113**	**12**	**10**	**497**	**151**	**671**	**30**	**12**	**13**	**55**	**4.6**	**124**	**5.3**
	Geometric Mean:			**6.80**	**44.2**	**113**	**9**	**6**	**474**	**138**	**635**	**19**	**9**	**11**	**52**	**4.4**	**120**	**4.4**
15-869	Trout	Outflow	4/30/15	7.11	47.4	204	32	18	822	80	953	181	30	85	296	3.3	307	3.8
15-1055	Trout	Outflow	5/28/15	6.93	46.8	201	237	37	681	96	1,051	228	20	69	317	6.3	250	6.8
15-1229	Trout	Outflow	6/25/15	7.96	134	374	61	15	773	391	1,241	152	20	77	249	2.7	15	6.2
15-1479	Trout	Outflow	7/29/15	6.99	59.2	234	3	14	1,012	599	1,628	180	19	66	265	2.6	125	4.8
15-1758	Trout	Outflow	8/27/15	6.76	55.8	222	169	31	1,225	527	1,953	197	13	50	260	7.2	126	10.2
15-1943	Trout	Outflow	9/17/15	6.79	45.4	173	257	37	1,131	159	1,584	169	15	35	219	2.1	206	2.6
15-2240	Trout	Outflow	10/15/15	6.91	37.8	152	411	54	1,166	230	1,862	194	26	30	249	2.1	299	1.5
15-2261	Trout	Outflow	10/22/15	6.76	47.8	164	395	114	890	187	1,586	179	45	23	247	3.7	304	3.8
15-2382	Trout	Outflow	11/4/15	6.81	34.2	144	371	368	941	151	1,831	190	7	15	212	1.0	303	1.7
15-2579	Trout	Outflow	11/24/15	6.93	32.8	150	145	477	1,773	182	2,577	157	43	30	230	1.9	310	3.3
15-2802	Trout	Outflow	12/10/15	7.00	39.2	168	13	731	939	200	1,883	166	99	60	325	1.8	292	2.7
15-2993	Trout	Outflow	12/23/15	6.99	67.8	198	50	440	1,143	174	1,807	180	13	47	240	4.5	160	7.6
16-31	Trout	Outflow	1/5/16	7.24	40.0	159	62	795	1,153	168	2,178	192	20	31	243	8.4	271	19.7
16-165	Trout	Outflow	1/18/16	7.14	35.2	165	28	920	922	206	2,077	203	5	20	228	1.9	247	2.7
16-320	Trout	Outflow	1/28/16	7.01	33.4	176	71	792	931	215	2,009	193	14	13	220	2.4	234	3.4
16-596	Trout	Outflow	3/2/16	7.11	39.4	172	72	224	1,044	209	1,549	127	27	47	201	4.7	216	12.3
16-774	Trout	Outflow	3/17/16	6.33	32.2	162	298	160	949	211	1,617	242	25	28	295	3.0	252	4.4
16-832	Trout	Outflow	3/29/16	6.69	31.8	182	343	1,046	85	146	1,620	218	75	23	316	1.7	214	2.9
16-916	Trout	Outflow	4/12/16	7.11	21.4	216	52	222	1,026	94	1,394	172	3	24	199	4.2	254	5.9
16-1440	Trout	Outflow	5/19/16	7.16	47.6	156	101	17	1,035	196	1,349	248	15	86	349	10.2	148	5.9
16-1658	Trout	Outflow	6/9/16	7.84	46.0	204	16	3	1,039	437	1,495	278	97	114	489	84.8	105	50.0
Trout Lake Outflow	**Minimum Value:**			**6.33**	**21.4**	**144**	**3**	**3**	**85**	**80**	**953**	**127**	**3**	**13**	**199**	**1.0**	**15**	**1.5**
	Maximum Value:			**7.96**	**134**	**374**	**411**	**1,046**	**1,773**	**599**	**2,577**	**278**	**99**	**114**	**489**	**84.8**	**310**	**50.0**
	Arithmetic Value:			**7.03**	**46.4**	**189**	**152**	**310**	**985**	**231**	**1,678**	**193**	**30**	**46**	**269**	**7.6**	**221**	**7.7**
	Geometric Mean:			**7.02**	**43.1**	**185**	**84**	**114**	**898**	**201**	**1,636**	**190**	**21**	**39**	**263**	**3.7**	**194**	**5.1**

APPENDIX I

CHARACTERISTICS OF SEEPAGE INFLOW SAMPLES COLLECTED IN LAKE YALE AND TROUT LAKE WITH AND WITHOUT SEDIMENT CONTACT

I.1 Lake Yale
I.2 Trout Lake

I.1 Lake Yale

Characteristics of Seepage Samples Collected in Lake Yale
from June 2015 - October 2016

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Yale	SP-1	7/30/15	7.96	177	550	1,789	67	31
Yale	SP-1	8/28/15	7.21	128	423	1,230	59	34
Yale	SP-1	9/22/15	7.56	131	446	1,641	18	65
Yale	SP-1	12/15/15	7.48	126	419	2,233	35	107
Yale	SP-1	2/3/16	7.61	200	551	3,983	29	39
Yale	SP-1	4/26/16	7.63	282	522	4,472	39	43
Yale	SP-1	6/21/16	7.71	256	561	3,245	42	38
Yale	SP-1	8/11/16	8.06	192	597	2,748	39	10
Yale	SP-1	10/25/16	7.83	203	584	3,150	40	40
	Geometric Mean:		**7.67**	**181**	**513**	**2,516**	**38**	**39**
Yale	SP-2	7/30/15	7.84	134	452	2,194	48	22
Yale	SP-2	9/22/15	7.68	147	443	2,037	32	61
Yale	SP-2	12/15/15	7.68	141	454	3,959	31	56
Yale	SP-2	2/3/16	7.79	135	426	1,658	22	32
Yale	SP-2	8/11/16	8.19	147	505	1,634	33	11
Yale	SP-2	10/25/16	7.78	142	483	1,856	35	28
	Geometric Mean:		**7.82**	**141**	**460**	**2,113**	**33**	**30**
Yale	SP-3	7/30/15	7.95	81	466	1,735	34	21
Yale	SP-3	8/28/15	7.68	124	430	1,475	22	25
Yale	SP-3	9/22/15	7.86	150	452	2,042	20	38
Yale	SP-3	2/3/16	7.89	123	417	1,350	21	34
Yale	SP-3	8/11/16	8.05	166	538	1,707	37	13
Yale	SP-3	10/25/16	7.96	158	451	1,653	33	20
	Geometric Mean:		**7.90**	**130**	**457**	**1,646**	**27**	**24**
Yale	SP-4	8/28/15	7.04	172	506	1,841	37	94
Yale	SP-4	9/22/15	7.42	174	487	3,736	65	280
Yale	SP-4	12/15/15	7.36	268	710	3,729	69	83
Yale	SP-4	2/3/16	7.39	253	676	2,892	24	108
Yale	SP-4	4/26/16	7.48	290	604	3,221	37	105
Yale	SP-4	6/21/16	7.63	277	623	2,705	42	76
Yale	SP-4	8/11/16	7.95	145	560	1,849	35	15
Yale	SP-4	10/25/16	7.50	196	601	2,304	48	84
	Geometric Mean:		**7.47**	**215**	**591**	**2,691**	**42**	**84**
Yale	SP-5	7/30/15	7.82	141	466	1,481	29	18
Yale	SP-5	8/28/15	7.26	166	474	2,583	41	32
Yale	SP-5	9/22/15	7.86	176	506	3,963	8	26
Yale	SP-5	12/15/15	7.86	150	460	2,533	30	35
Yale	SP-5	2/3/16	7.63	140	444	2,050	23	31
Yale	SP-5	8/11/16	7.86	158	520	1,777	40	12
Yale	SP-5	10/25/16	7.72	152	489	2,231	45	27
	Geometric Mean:		**7.71**	**154**	**479**	**2,272**	**28**	**24**

Characteristics of Seepage Samples Collected in Lake Yale
from June 2015 - October 2016

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Yale	SP-6	7/30/15	8.08	134	450	1,509	33	33
Yale	SP-6	9/22/15	7.97	147	480	3,448	32	29
Yale	SP-6	12/15/15	7.89	139	469	2,438	35	31
Yale	SP-6	2/3/16	7.72	123	429	1,536	22	35
Yale	SP-6	4/26/16	7.91	138	391	2,174	25	33
Yale	SP-6	8/11/16	7.95	141	492	1,416	33	10
Yale	SP-6	10/25/16	7.83	146	456	1,846	35	27
	Geometric Mean:		**7.91**	**138**	**451**	**1,959**	**30**	**27**
Yale	SP-7	8/28/15	7.32	135	418	1,917	19	35
Yale	SP-7	9/22/15	8.14	233	514	6,108	42	38
Yale	SP-7	12/15/15	8.10	130	426	1,555	40	32
Yale	SP-7	8/11/16	8.02	181	457	2,387	38	39
Yale	SP-7	10/25/16	7.93	177	439	3,654	49	33
	Geometric Mean:		**7.90**	**167**	**450**	**2,755**	**36**	**35**
Yale	SP-8	7/30/15	7.82	140	461	2,842	49	27
Yale	SP-8	8/28/15	7.64	134	418	2,693	38	26
Yale	SP-8	9/22/15	7.89	181	416	5,479	72	19
Yale	SP-8	2/3/16	7.92	120	410	1,663	26	39
Yale	SP-8	4/26/16	7.88	122	399	1,412	23	28
Yale	SP-8	6/21/16	7.83	138	436	1,921	38	29
Yale	SP-8	8/11/16	7.86	144	472	1,767	32	19
Yale	SP-8	10/25/16	7.76	134	413	1,856	39	23
	Geometric Mean:		**7.82**	**138**	**427**	**2,234**	**37**	**26**
Yale	SP-9	8/28/15	7.82	163	473	6,589	17	19
Yale	SP-9	9/22/15	7.73	173	486	3,268	27	26
Yale	SP-9	2/3/16	7.84	162	473	2,454	27	32
Yale	SP-9	4/26/16	7.85	152	421	2,603	26	25
Yale	SP-9	6/21/16	7.92	148	465	2,380	34	28
Yale	SP-9	8/11/16	7.99	141	482	1,824	38	12
Yale	SP-9	10/25/16	7.88	153	473	2,029	41	20
	Geometric Mean:		**7.86**	**156**	**467**	**2,757**	**29**	**22**
Yale	SP-10	7/30/15	8.09	197	543	3,639	37	48
Yale	SP-10	9/22/15	7.91	203	440	2,599	30	34
Yale	SP-10	4/26/16	7.70	173	456	5,785	29	47
Yale	SP-10	6/21/16	7.89	168	483	4,309	35	43
Yale	SP-10	8/11/16	7.82	161	508	2,661	33	11
Yale	SP-10	10/25/16	7.75	179	496	3,547	38	38
	Geometric Mean:		**7.86**	**180**	**487**	**3,613**	**33**	**33**

Characteristics of Seepage Samples Collected in Lake Yale
from June 2015 - October 2016

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Yale	SP-11	9/22/15	7.95	211	434	1,802	29	17
Yale	SP-11	4/26/16	7.76	136	468	2,568	23	33
Yale	SP-11	6/21/16	7.83	145	483	1,973	28	28
Yale	SP-11	8/11/16	7.92	138	492	1,612	31	10
Yale	SP-11	10/25/16	7.79	141	472	1,815	32	36
	Geometric Mean:		**7.85**	**152**	**469**	**1,929**	**28**	**22**
Yale	SP-12	7/30/15	7.99	200	579	5,843	142	31
Yale	SP-12	8/28/15	7.87	282	698	6,259	143	22
Yale	SP-12	9/22/15	7.69	162	638	5,683	169	25
Yale	SP-12	12/15/15	7.93	154	458	2,249	182	29
Yale	SP-12	2/3/16	7.81	158	471	2,029	112	20
Yale	SP-12	4/26/16	7.96	172	451	2,934	314	25
Yale	SP-12	6/21/16	7.92	183	463	3,243	258	23
Yale	SP-12	10/25/16	7.73	167	487	3,144	174	28
	Geometric Mean:		**7.86**	**181**	**524**	**3,603**	**178**	**25**
Yale	SP-13	7/30/15	7.59	83	517	1,553	43	24
Yale	SP-13	8/28/15	7.04	100	362	1,069	181	18
Yale	SP-13	2/3/16	7.98	136	444	1,962	29	25
Yale	SP-13	8/11/16	7.63	108	402	1,482	83	30
Yale	SP-13	10/25/16	7.31	102	387	1,656	54	28
	Geometric Mean:		**7.50**	**105**	**419**	**1,516**	**63**	**25**
Yale	SP-14	7/30/15	7.93	162	510	2,713	130	19
Yale	SP-14	8/28/15	7.59	145	474	3,691	57	16
Yale	SP-14	9/23/15	7.66	132	423	2,843	54	41
	Geometric Mean:		**7.73**	**146**	**468**	**3,054**	**74**	**23**
Yale	SP-15	7/30/15	7.80	174	552	3,813	40	19
Yale	SP-15	8/28/15	7.56	130	436	3,622	50	22
Yale	SP-15	9/23/15	7.74	200	642	5,290	29	28
Yale	SP-15	8/11/16	7.96	145	507	2,188	37	14
Yale	SP-15	10/25/16	7.85	154	602	2,531	41	22
	Geometric Mean:		**7.78**	**159**	**543**	**3,322**	**39**	**20**
Yale	SP-16	7/30/15	7.25	163	675	4,382	49	28
Yale	SP-16	8/28/15	7.22	166	532	4,487	44	21
Yale	SP-16	9/23/15	7.67	181	521	5,312	14	30
Yale	SP-16	12/15/15	7.66	137	447	3,864	56	37
	Geometric Mean:		**7.45**	**161**	**538**	**4,482**	**36**	**28**
Yale	SP-17	7/30/15	7.40	151	501	3,569	71	21
Yale	SP-17	8/28/15	7.46	142	478	3,312	62	22
Yale	SP-17	9/23/15	7.44	197	521	2,927	56	29
	Geometric Mean:		**7.43**	**162**	**500**	**3,259**	**63**	**24**

Lake Yale Seepage Measurements Without Sediments

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Yale	SP-3-W/O	7/30/15	8.02	136	472	1,753	36	18
Yale	SP-3-W/O	8/28/15	7.37	131	438	2,751	45	18
Yale	SP-3-W/O	9/22/15	7.79	142	449	1,647	35	32
Yale	SP-3-W/O	12/15/15	8.03	166	497	2,834	31	18
Yale	SP-3-W/O	2/3/16	8.00	151	471	1,451	21	25
Yale	SP-3-W/O	4/26/16	7.56	129	467	1,728	29	34
Yale	SP-3-W/O	8/11/16	8.16	147	501	1,618	35	10
Yale	SP-3-W/O	10/25/16	7.80	153	485	1,692	41	19
	Geometric Mean:		**7.84**	**144**	**472**	**1,878**	**33**	**20**
Yale	SP-9-W/O	7/30/15	7.79	167	491	3,231	25	26
Yale	SP-9-W/O	8/28/15	7.91	211	551	2,461	32	17
Yale	SP-9-W/O	12/15/15	8.07	137	444	2,048	51	33
Yale	SP-9-W/O	2/3/16	7.96	179	512	3,216	22	31
Yale	SP-9-W/O	8/11/16	7.92	151	504	2,497	35	11
Yale	SP-9-W/O	10/25/16	7.98	163	502	2,791	36	30
	Geometric Mean:		**7.94**	**166**	**500**	**2,673**	**32**	**23**
Yale	SP-15-W/O	7/30/15	8.09	153	498	3,585	60	21
Yale	SP-15-W/O	8/28/15	7.61	134	440	2,360	45	15
Yale	SP-15-W/O	9/23/15	7.63	142	470	2,502	50	28
Yale	SP-15-W/O	12/15/15	7.98	131	430	2,152	62	34
	Geometric Mean:		**7.82**	**140**	**459**	**2,598**	**54**	**23**
Yale	SP-16-SW	7/30/15	7.29	159	523	3,057	49	29
Yale	SP-16-SW	8/28/15	7.12	170	496	5,420	52	25
Yale	SP-16-SW	9/23/15	7.72	178	512	3,170	46	22
Yale	SP-16-SW	12/15/15	7.62	194	558	3,108	48	65
	Geometric Mean:		**7.43**	**175**	**522**	**3,575**	**49**	**32**
Yale	SP-17-SW	7/30/15	7.40	245	664	5,335	104	47
Yale	SP-17-SW	8/28/15	6.99	227	594	5,892	110	52
Yale	SP-17-SW	9/23/15	7.29	240	622	6,025	83	71
	Geometric Mean:		**7.22**	**237**	**626**	**5,743**	**98**	**56**

I.2 Trout Lake

Characteristics of Seepage Inflow Samples Collected in Trout Lake from June 2015 - October 2016

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Trout	SP-1	7/29/15	7.23	61.0	240	2,081	187	111
Trout	SP-1	8/27/15	6.62	59.8	222	7,155	736	130
Trout	SP-1	9/23/15	7.39	133	326	7,723	813	145
Trout	SP-1	12/15/15	7.12	42.2	184	2,231	107	234
Trout	SP-1	2/3/16	7.04	45.4	200	5,198	149	131
Trout	SP-1	4/26/16	6.68	40.8	188	1,932	257	233
Trout	SP-1	6/21/16	7.03	47.6	203	2,341	196	187
Trout	SP-1	8/11/16	7.26	53.7	226	2,087	176	176
Trout	SP-1	10/28/16	7.09	47.5	270	1,598	145	135
	Geometric Mean:		**7.05**	**55.0**	**225**	**3,007**	**236**	**159**
Trout	SP-2	7/29/15	6.99	58.4	256	2,854	802	136
Trout	SP-2	8/27/15	6.78	60.4	245	2,919	569	126
Trout	SP-2	9/23/15	7.14	73.6	256	4,887	653	138
Trout	SP-2	12/15/15	7.19	47.6	205	3,354	352	183
Trout	SP-2	2/3/16	7.01	34.8	175	2,281	196	215
Trout	SP-2	4/26/16	6.89	33.4	243	1,624	226	244
Trout	SP-2	6/21/16	7.03	38.4	238	2,077	223	238
Trout	SP-2	8/11/16	7.11	40.9	219	2,118	287	222
Trout	SP-2	10/28/16	6.83	43.3	227	2,031	254	229
	Geometric Mean:		**7.00**	**46.3**	**228**	**2,548**	**348**	**187**
Trout	SP-3	7/29/15	7.42	71.4	289	5,147	562	125
Trout	SP-3	8/27/15	7.11	77.8	267	4,155	516	133
Trout	SP-3	9/23/15	7.31	76.4	274	6,595	978	171
Trout	SP-3	12/15/15	6.92	39.6	183	5,011	647	237
Trout	SP-3	2/3/16	7.17	93.8	344	7,251	447	164
Trout	SP-3	4/26/16	6.90	40.0	310	1,932	347	240
Trout	SP-3	8/11/16	7.03	65.4	298	2,023	289	177
Trout	SP-3	10/28/16	7.19	58.2	283	1,973	247	153
	Geometric Mean:		**7.13**	**62.7**	**277**	**3,755**	**461**	**171**
Trout	SP-4	7/29/15	7.59	167	421	4,638	576	118
Trout	SP-4	8/27/15	7.54	210	477	2,683	343	102
Trout	SP-4	9/23/15	7.71	208	210	6,343	807	90
Trout	SP-4	2/3/16	7.42	83.6	296	4,429	608	160
Trout	SP-4	4/26/16	7.43	133	196	7,517	334	131
Trout	SP-4	6/21/16	7.38	108	206	5,414	439	158
Trout	SP-4	8/11/16	7.40	123	222	6,320	502	144
Trout	SP-4	10/28/16	7.51	145	234	4,982	487	153
	Geometric Mean:		**7.50**	**141**	**267**	**5,086**	**493**	**129**

Characteristics of Seepage Inflow Samples Collected in Trout Lake from June 2015 - October 2016

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Trout	SP-5	7/29/15	7.19	61.0	251	3,115	489	107
Trout	SP-5	8/27/15	7.02	98.6	239	1,878	494	123
Trout	SP-5	9/23/15	7.09	61.4	182	3,339	584	207
Trout	SP-5	12/15/15	7.06	75.6	259	1,934	1,014	124
Trout	SP-5	2/3/16	6.98	66.4	248	564	743	182
Trout	SP-5	4/26/16	6.68	35.4	189	1,443	253	189
Trout	SP-5	6/21/16	6.81	43.6	225	1,067	423	195
Trout	SP-5	8/11/16	6.93	68.2	244	856	454	173
Trout	SP-5	10/28/16	7.02	64.8	278	707	87	27
	Geometric Mean:		**6.97**	**61.5**	**233**	**1,394**	**425**	**130**
Trout	SP-6	7/29/15	7.20	67.8	259	9,525	1,732	121
Trout	SP-6	8/27/15	7.24	91.8	344	4,756	2,552	116
Trout	SP-6	9/23/15	7.44	155	320	11,550	2,412	134
Trout	SP-6	12/15/15	7.04	75.4	304	5,270	868	143
Trout	SP-6	2/3/16	6.83	55.8	230	6,124	297	186
Trout	SP-6	6/21/16	7.26	63.6	307	7,545	737	180
Trout	SP-6	8/11/16	7.08	81.2	290	6,915	1,110	176
Trout	SP-6	10/28/16	7.13	88.4	283	7,084	1,023	144
	Geometric Mean:		**7.15**	**81.0**	**290**	**7,070**	**1,110**	**148**

Trout Lake Seepage Measurements Without Sediments

Lake	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Total N (µg/L)	Total P (µg/L)	Color (Pt-Co)
Trout	SP-4 W/O	7/29/15	7.61	107	370	5,353	963	136
Trout	SP-4 W/O	8/27/15	7.26	114	353	6,059	1,032	133
Trout	SP-4 W/O	9/23/15	6.96	54.2	187	2,009	285	218
Trout	SP-4 W/O	12/15/15	7.39	79.4	276	3,130	674	164
Trout	SP-4 W/O	2/3/16	7.09	34.4	185	3,354	393	223
Trout	SP-4 W/O	4/26/16	7.33	81.6	188	3,115	360	200
Trout	SP-4 W/O	6/21/16	7.21	93.8	193	3,428	423	176
Trout	SP-4 W/O	8/11/16	7.28	88.2	189	3,302	381	203
Trout	SP-4 W/O	10/28/16	7.16	90.2	202	4,110	364	216
	Geometric Mean:		**7.25**	**78.2**	**229**	**3,590**	**489**	**182**
Trout	SP-5 W/O	7/29/15	7.22	81.2	263	2,593	255	111
Trout	SP-5 W/O	8/27/15	6.96	99.8	296	4,834	1,501	144
Trout	SP-5 W/O	9/23/15	7.37	135.0	233	10,091	1,796	123
Trout	SP-5 W/O	12/15/15	6.99	54.6	220	2,548	241	154
Trout	SP-5 W/O	2/3/16	6.84	81.8	208	8,512	306	182
Trout	SP-5 W/O	4/26/16	6.87	58.8	206	3,714	880	149
Trout	SP-5 W/O	6/21/16	6.94	76.4	237	4,535	851	157
Trout	SP-5 W/O	8/11/16	7.03	83.6	281	4,417	826	138
Trout	SP-5 W/O	10/28/16	6.85	87.2	303	4,294	718	35
	Geometric Mean:		**7.01**	**81.6**	**247**	**4,574**	**656**	**123**
Trout	SP-6 W/O	8/27/15	7.22	146	377	8,041	2,511	119
Trout	SP-6 W/O	9/23/15	7.52	140	312	8,628	2,077	112
Trout	SP-6 W/O	12/15/15	7.26	53.0	229	3,550	477	186
Trout	SP-6 W/O	2/3/16	7.07	48.0	231	3,088	247	201
Trout	SP-6 W/O	4/26/16	6.95	112	193	7,616	1,339	138
Trout	SP-6 W/O	6/21/16	7.08	103	223	6,358	843	163
Trout	SP-6 W/O	8/11/16	7.22	109	257	4,721	568	151
Trout	SP-6 W/O	10/28/16	7.15	99.4	228	5,083	654	127
	Geometric Mean:		**7.18**	**94.7**	**251**	**5,537**	**844**	**147**
Trout	SP-9 SW	8/11/16	7.92	151	504	2,497	35	11
	Geometric Mean:		**7.92**	**151**	**504**	**2,497**	**35**	**11**

APPENDIX J

RESULTS OF SEDIMENT BENTHIC RELEASE EXPERIMENTS TO EVALUATE INTERNAL RECYCLING

J.1 Lake Yale
J.2 Trout Lake

J.1 Lake Yale

Results of Sediment Benthic Phosphorus Release Rate Studies in Lake Yale

Site	Redox Condition	Date Collected	Time (days)	NH3 (µg/L)	NO_X (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	Volume (L)	Total N (µg)	SRP (µg)	Total P (µg)
Starting water level (inches):			24.00	Ending water level (inches):						20.50				
Lake Yale Site # 1	Anoxic	11/30/15	0	3	463	901	1,367	12	13	25	4.84	6,617	58	121
		12/1/15	1	13	441	945	1,399	12	14	26	4.82	6,737	58	125
		12/2/15	2	14	264	1,126	1,404	12	16	28	4.79	6,725	57	134
		12/3/15	3	31	192	1,186	1,409	13	17	30	4.76	6,714	62	143
		12/4/15	4	37	152	1,237	1,426	13	20	33	4.74	6,759	62	156
		12/7/15	7	208	97	1,142	1,447	14	24	38	4.66	6,749	65	177
		12/9/15	9	255	50	1,163	1,468	15	25	40	4.61	6,773	69	185
		12/11/15	11	273	50	1,146	1,469	18	27	45	4.56	6,703	82	205
		12/14/15	14	298	48	1,151	1,497	21	25	46	4.49	6,718	94	206
		12/16/15	16	302	41	1,158	1,501	23	25	48	4.44	6,660	102	213
		12/18/15	18	314	41	1,150	1,505	24	27	51	4.39	6,602	105	224
		12/21/15	21	363	32	1,129	1,524	27	29	56	4.31	6,570	116	241
		12/23/15	23	401	19	1,115	1,535	27	32	59	4.26	6,540	115	251
		12/28/15	28	402	14	1,148	1,564	28	39	67	4.13	6,467	116	277
Starting water level (inches):			24.00	Ending water level (inches):						21.00				
Lake Yale Site #1	Aerobic	12/29/15	0	366	92	1,120	1,212	20	13	33	4.84	5,867	97	160
		12/30/15	1	340	120	956	1,442	21	14	35	4.82	6,950	101	169
		12/31/15	2	326	199	996	1,535	23	13	36	4.80	7,366	110	173
		1/4/16	6	239	200	1,014	1,540	23	15	38	4.72	7,262	108	179
		1/6/16	8	171	293	1,067	1,599	24	16	40	4.67	7,473	112	187
		1/8/16	10	19	644	985	1,648	25	16	41	4.63	7,633	116	190
		1/11/16	13	17	817	867	1,701	25	16	41	4.57	7,772	114	187
		1/13/16	15	8	850	890	1,748	25	17	42	4.53	7,914	113	190
		1/15/16	17	6	884	898	1,788	26	19	45	4.49	8,021	117	202
		1/18/16	20	5	908	1,003	1,916	26	14	40	4.42	8,475	115	177
		1/20/16	22	3	1,117	1,131	2,251	26	13	39	4.38	9,863	114	171
		1/22/16	24	3	1,166	1,136	2,305	26	12	38	4.34	10,003	113	165
		1/25/16	27	3	1,200	1,127	2,330	27	16	43	4.28	9,966	115	184
		1/27/16	29	3	1,222	1,202	2,427	27	11	38	4.24	10,280	114	161
Starting water level (inches):			24.00	Ending water level (inches):						19.00				
Lake Yale Site # 2	Anoxic	11/30/15	0	3	516	779	1,298	12	12	24	4.84	6,283	58	116
		12/1/15	1	3	475	807	1,285	14	12	26	4.80	6,174	67	125
		12/2/15	2	13	473	861	1,347	13	14	27	4.77	6,423	62	129
		12/3/15	3	37	470	914	1,421	14	15	29	4.73	6,725	66	137
		12/4/15	4	58	407	956	1,421	14	19	33	4.70	6,674	66	155
		12/7/15	7	59	229	1,231	1,519	14	27	41	4.59	6,970	64	188
		12/9/15	9	66	228	1,228	1,522	15	35	50	4.52	6,874	68	226
		12/11/15	11	107	199	1,287	1,593	17	38	55	4.44	7,080	76	244
		12/14/15	14	117	101	1,290	1,508	19	38	57	4.34	6,539	82	247
		12/16/15	16	225	72	1,274	1,571	22	39	61	4.26	6,699	94	260
		12/18/15	18	253	65	1,184	1,502	26	39	65	4.19	6,297	109	272
		12/21/15	21	281	44	1,162	1,487	32	44	76	4.08	6,073	131	310
		12/23/15	23	298	29	1,154	1,481	34	47	81	4.01	5,942	136	325
		12/28/15	28	317	26	1,068	1,411	33	49	82	3.83	5,407	126	314

Results of Sediment Benthic Phosphorus Release Rate Studies in Lake Yale

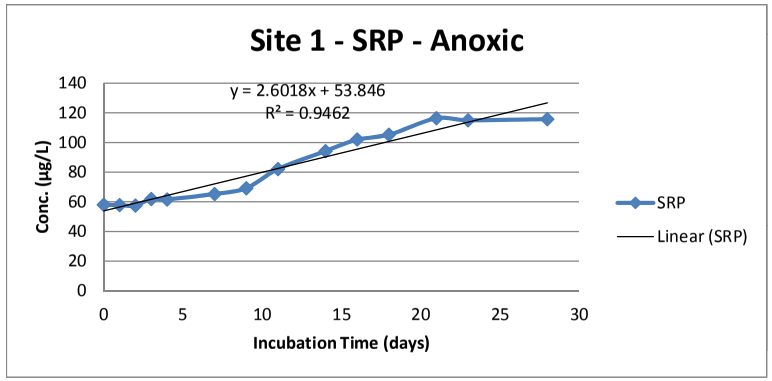
Site	Redox Condition	Date Collected	Time (days)	NH3 (µg/L)	NO_X (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	Volume (L)	Total N (µg)	SRP (µg)	Total P (µg)
Starting water level (inches):			24.00	Ending water level (inches):						20.00				
Lake Yale Site #2	Aerobic	12/29/15	0	150	181	1,224	1,555	22	2	24	4.84	7,527	106	116
		12/30/15	1	79	258	1,271	1,608	23	2	25	4.81	7,739	111	120
		12/31/15	2	9	298	1,331	1,638	23	3	26	4.78	7,838	110	124
		1/4/16	6	5	376	1,301	1,682	25	3	28	4.67	7,861	117	131
		1/6/16	8	3	422	1,286	1,711	25	4	29	4.62	7,901	115	134
		1/8/16	10	3	431	1,365	1,799	25	5	30	4.56	8,208	114	137
		1/11/16	13	3	434	1,440	1,877	25	6	31	4.48	8,407	112	139
		1/13/16	15	3	536	1,407	1,946	26	6	32	4.42	8,608	115	142
		1/15/16	17	3	554	1,474	2,031	26	7	33	4.37	8,871	114	144
		1/18/16	20	3	648	1,427	2,078	26	7	33	4.28	8,903	111	141
		1/20/16	22	3	648	1,435	2,086	28	6	34	4.23	8,821	118	144
		1/22/16	24	3	761	1,330	2,094	29	6	35	4.17	8,738	121	146
		1/25/16	27	3	775	1,418	2,196	29	9	38	4.09	8,980	119	155
		1/27/16	29	3	809	1,460	2,272	35	5	40	4.03	9,165	141	161
Starting water level (inches):			24.00	Ending water level (inches):						21.75				
Lake Yale Site # 3	Anoxic	11/30/15	0	3	927	598	1,528	13	29	42	4.84	7,396	63	203
		12/1/15	1	3	718	832	1,553	13	35	48	4.82	7,492	63	232
		12/2/15	2	3	521	961	1,485	15	40	55	4.81	7,140	72	264
		12/3/15	3	19	495	1,101	1,615	16	41	57	4.79	7,739	77	273
		12/4/15	4	32	494	1,254	1,780	26	48	74	4.78	8,501	124	353
		12/7/15	7	93	450	1,433	1,976	38	50	88	4.73	9,341	180	416
		12/9/15	9	187	441	1,353	1,981	54	49	103	4.69	9,300	254	484
		12/11/15	11	193	435	1,479	2,107	67	57	124	4.66	9,823	312	578
		12/14/15	14	306	381	1,449	2,136	86	66	152	4.61	9,855	397	701
		12/16/15	16	386	255	1,514	2,155	94	68	162	4.58	9,873	431	742
		12/18/15	18	509	235	1,522	2,266	108	73	181	4.55	10,308	491	823
		12/21/15	21	560	215	1,585	2,360	129	75	204	4.50	10,620	581	918
		12/23/15	23	595	212	1,557	2,364	135	86	221	4.47	10,562	603	987
		12/28/15	28	608	175	1,598	2,381	142	64	206	4.39	10,445	623	904
Starting water level (inches):			24.00	Ending water level (inches):						22.00				
Lake Yale Site #3	Aerobic	12/29/15	0	1,492	27	731	2,250	25	6	31	4.84	10,891	121	150
		12/30/15	1	1,483	80	895	2,458	26	8	34	4.83	11,864	125	164
		12/31/15	2	1,405	179	955	2,539	26	9	35	4.81	12,220	125	168
		1/4/16	6	1,347	379	955	2,681	27	10	37	4.76	12,754	128	176
		1/6/16	8	1,228	741	915	2,884	27	11	38	4.73	13,639	128	180
		1/8/16	10	15	2,231	937	3,183	29	12	41	4.70	14,965	136	193
		1/11/16	13	10	2,080	1,085	3,175	32	12	44	4.66	14,795	149	205
		1/13/16	15	6	2,225	1,199	3,430	37	13	50	4.63	15,887	171	232
		1/15/16	17	3	2,449	1,199	3,651	38	16	54	4.60	16,810	175	249
		1/18/16	20	3	2,576	1,495	4,074	38	19	57	4.56	18,587	173	260
		1/20/16	22	3	2,813	1,419	4,235	39	22	61	4.53	19,204	177	277
		1/22/16	24	3	3,255	1,274	4,532	44	23	67	4.51	20,424	198	302
		1/25/16	27	3	3,341	1,169	4,513	55	13	68	4.46	20,151	246	304
		1/27/16	29	3	3,615	1,231	4,849	56	18	74	4.44	21,516	248	328

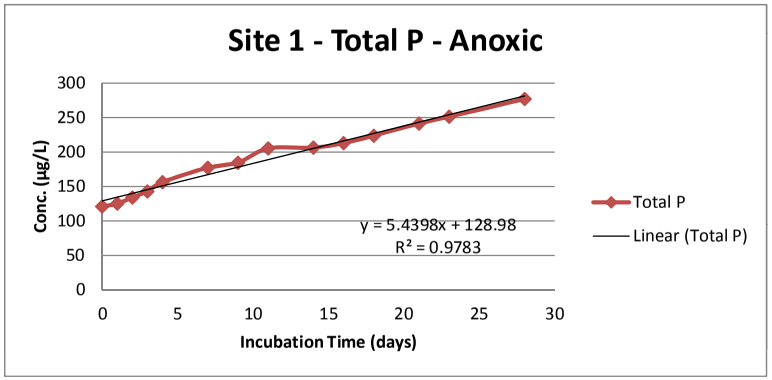
Results of Sediment Benthic Phosphorus Release Rate Studies in Lake Yale

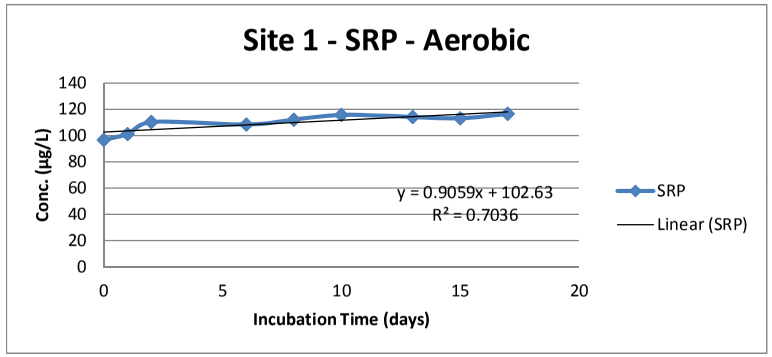
Site	Redox Condition	Date Collected	Time (days)	NH3 (µg/L)	NO_X (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	Volume (L)	Total N (µg)	SRP (µg)	Total P (µg)
Starting water level (inches):			24.00	Ending water level (inches):						21.00				
Lake Yale Site # 4	Anoxic	11/30/15	0	3	562	774	1,339	13	23	36	4.84	6,482	63	174
		12/1/15	1	3	551	844	1,398	13	29	42	4.82	6,737	63	202
		12/2/15	2	17	538	819	1,374	14	31	45	4.80	6,592	67	216
		12/3/15	3	40	509	919	1,468	22	32	54	4.78	7,011	105	258
		12/4/15	4	56	478	928	1,462	34	35	69	4.75	6,951	162	328
		12/7/15	7	65	476	1,071	1,612	54	39	93	4.69	7,559	253	436
		12/9/15	9	73	406	1,135	1,614	65	40	105	4.65	7,499	302	488
		12/11/15	11	111	368	1,102	1,581	75	46	121	4.60	7,277	345	557
		12/14/15	14	113	263	1,181	1,557	85	48	133	4.54	7,066	386	604
		12/16/15	16	116	201	1,291	1,608	96	46	142	4.49	7,228	432	638
		12/18/15	18	160	195	1,208	1,563	108	46	154	4.45	6,958	481	686
		12/21/15	21	275	87	1,188	1,550	142	47	189	4.39	6,799	623	829
		12/23/15	23	315	77	1,166	1,558	132	50	182	4.34	6,767	573	791
		12/28/15	28	394	48	1,066	1,508	141	49	190	4.24	6,387	597	805
Starting water level (inches):			24.00	Ending water level (inches):						21.50				
Lake Yale Site #4	Aerobic	12/29/15	0	659	34	1,015	1,708	20	2	22	4.84	8,268	97	106
		12/30/15	1	662	62	1,029	1,753	21	2	23	4.82	8,455	101	111
		12/31/15	2	649	110	1,073	1,832	21	3	24	4.81	8,804	101	115
		1/4/16	6	666	245	1,084	1,995	22	3	25	4.74	9,449	104	118
		1/6/16	8	26	922	1,074	2,022	23	3	26	4.70	9,506	108	122
		1/8/16	10	24	993	1,094	2,111	25	2	27	4.67	9,851	117	126
		1/11/16	13	8	1,077	1,111	2,196	25	2	27	4.61	10,133	115	125
		1/13/16	15	5	1,083	1,152	2,240	26	2	28	4.58	10,259	119	128
		1/15/16	17	3	1,157	1,265	2,425	26	3	29	4.54	11,022	118	132
		1/18/16	20	3	1,164	1,345	2,512	26	4	30	4.49	11,286	117	135
		1/20/16	22	3	1,240	1,352	2,595	27	4	31	4.46	11,569	120	138
		1/22/16	24	3	1,434	1,173	2,610	28	4	32	4.42	11,545	124	142
		1/25/16	27	3	1,438	1,110	2,551	28	4	32	4.37	11,151	122	140
		1/27/16	29	3	1,466	1,028	2,497	29	6	35	4.34	10,828	126	152
Starting water level (inches):			24.00	Ending water level (inches):						20.75				
Lake Yale Site # 5	Anoxic	11/30/15	0	3	816	519	1,338	11	11	22	4.84	6,477	53	106
		12/1/15	1	3	799	573	1,375	12	16	28	4.82	6,624	58	135
		12/2/15	2	6	757	669	1,432	12	20	32	4.79	6,865	58	153
		12/3/15	3	27	664	791	1,482	13	21	34	4.77	7,070	62	162
		12/4/15	4	45	492	966	1,503	13	27	40	4.75	7,135	62	190
		12/7/15	7	48	235	1,369	1,652	13	29	42	4.68	7,726	61	196
		12/9/15	9	64	233	1,409	1,706	13	31	44	4.63	7,899	60	204
		12/11/15	11	69	218	1,453	1,740	13	32	45	4.58	7,974	60	206
		12/14/15	14	76	144	1,541	1,761	14	34	48	4.51	7,947	63	217
		12/16/15	16	102	104	1,590	1,796	21	30	51	4.47	8,021	94	228
		12/18/15	18	176	97	1,544	1,817	26	27	53	4.42	8,030	115	234
		12/21/15	21	384	89	1,365	1,838	27	28	55	4.35	7,993	117	239
		12/23/15	23	426	75	1,419	1,920	27	33	60	4.30	8,260	116	258
		12/28/15	28	433	75	1,600	2,108	29	40	69	4.19	8,822	121	289

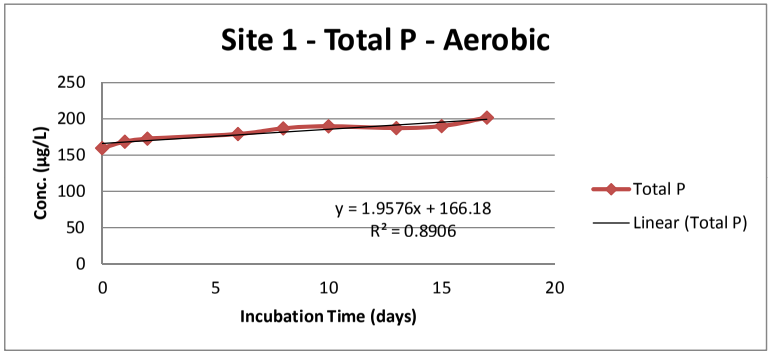
Results of Sediment Benthic Phosphorus Release Rate Studies in Lake Yale

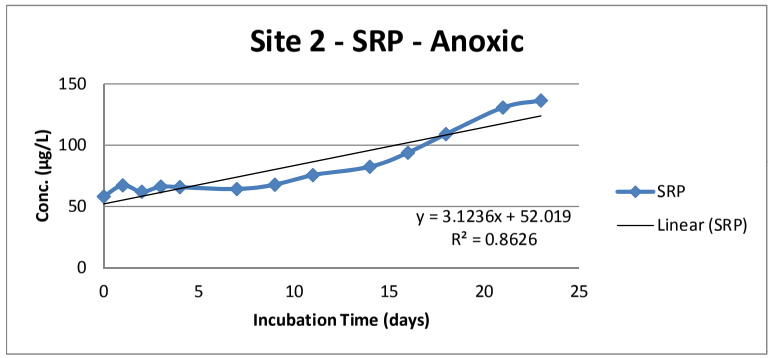
Site	Redox Condition	Date Collected	Time (days)	NH3 (µg/L)	NO_X (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	Volume (L)	Total N (µg)	SRP (µg)	Total P (µg)
Starting water level (inches):			24.00	Ending water level (inches):						23.00				
Lake Yale Site #5	Aerobic	12/29/15	0	1,088	4	664	1,756	19	3	22	4.84	8,500	92	106
		12/30/15	1	969	12	820	1,801	20	3	23	4.83	8,705	97	111
		12/31/15	2	943	24	880	1,847	21	3	24	4.83	8,915	101	116
		1/4/16	6	930	44	882	1,856	21	4	25	4.80	8,907	101	120
		1/6/16	8	861	122	923	1,906	22	4	26	4.78	9,120	105	124
		1/8/16	10	830	148	1,010	1,988	22	5	27	4.77	9,485	105	129
		1/11/16	13	759	325	1,057	2,141	24	4	28	4.75	10,170	114	133
		1/13/16	15	555	686	1,090	2,331	25	5	30	4.74	11,040	118	142
		1/15/16	17	11	1,498	1,068	2,577	25	6	31	4.72	12,169	118	146
		1/18/16	20	8	1,643	1,169	2,820	25	5	30	4.70	13,258	118	141
		1/20/16	22	7	1,659	1,202	2,868	25	3	28	4.69	13,444	117	131
		1/22/16	24	3	1,827	1,057	2,887	26	3	29	4.67	13,493	122	136
		1/25/16	27	3	1,967	1,186	3,156	26	4	30	4.65	14,684	121	140
		1/27/16	29	3	1,993	1,178	3,174	27	3	30	4.64	14,724	125	139

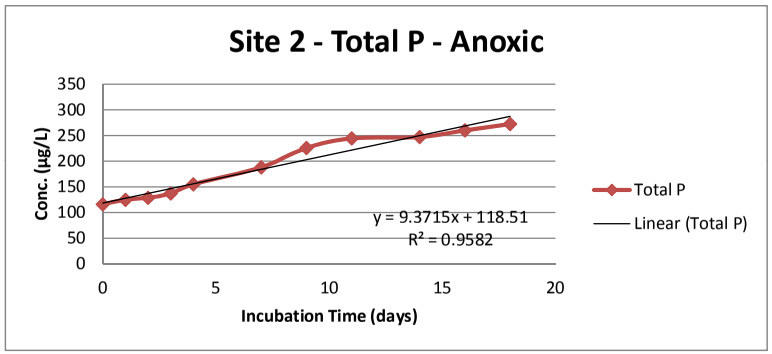

Site 1 - SRP - Anoxic
y = 2.6018x + 53.846
R² = 0.9462
Conc. (µg/L)
Incubation Time (days)
SRP
Linear (SRP)

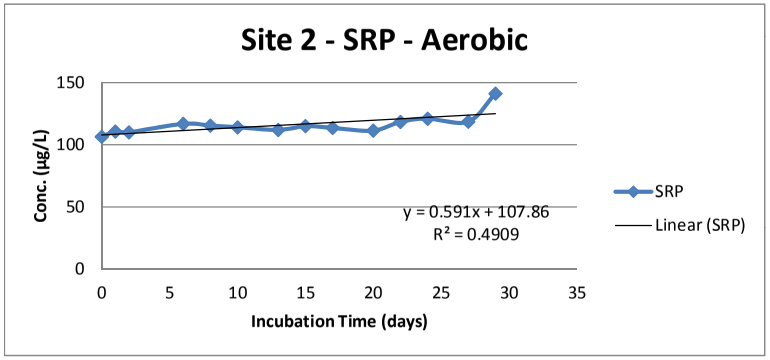

Site 1 - Total P - Anoxic
y = 5.4398x + 128.98
R² = 0.9783
Conc. (µg/L)
Incubation Time (days)
Total P
Linear (Total P)

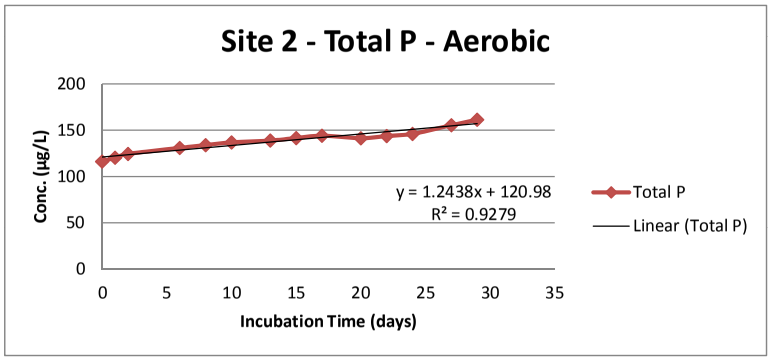

Site 1 - SRP - Aerobic
y = 0.9059x + 102.63
R² = 0.7036
Conc. (µg/L)
Incubation Time (days)
SRP
Linear (SRP)

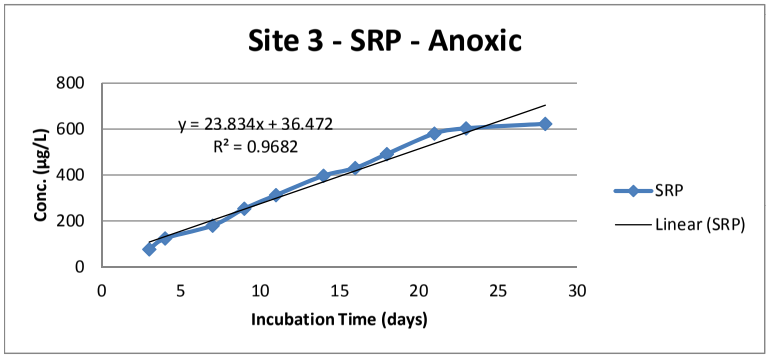

Site 1 - Total P - Aerobic
y = 1.9576x + 166.18
R² = 0.8906
Conc. (µg/L)
Incubation Time (days)
Total P
Linear (Total P)

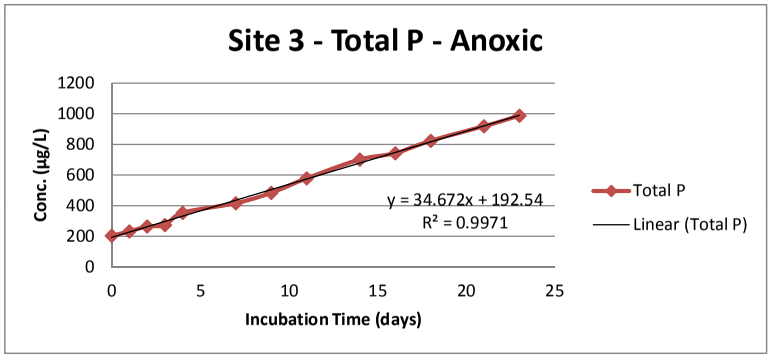

Site 2 - SRP - Anoxic
y = 3.1236x + 52.019
R² = 0.8626
Conc. (µg/L)
Incubation Time (days)
SRP
Linear (SRP)

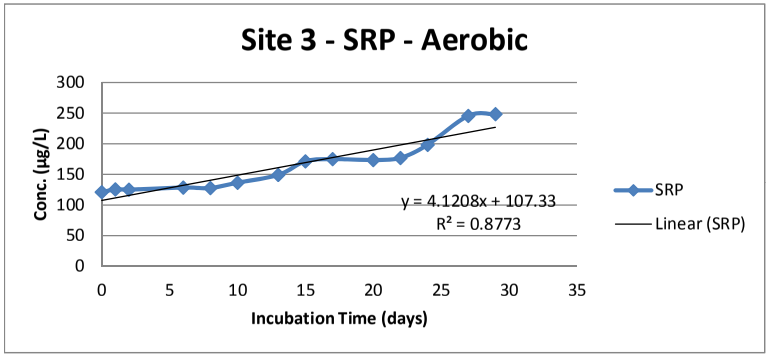

Site 2 - Total P - Anoxic
y = 9.3715x + 118.51
R² = 0.9582
Conc. (µg/L)
Incubation Time (days)
Total P
Linear (Total P)

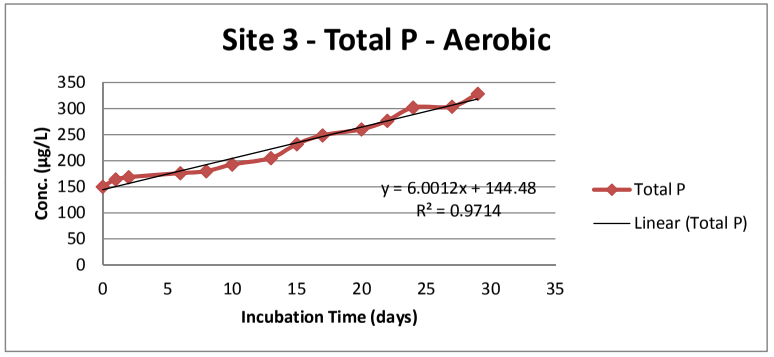

Site 2 - SRP - Aerobic
Conc. (µg/L)
150
100
50
0
0 5 10 15 20 25 30 35
Incubation Time (days)
y = 0.591x + 107.86
R² = 0.4909
SRP
Linear (SRP)

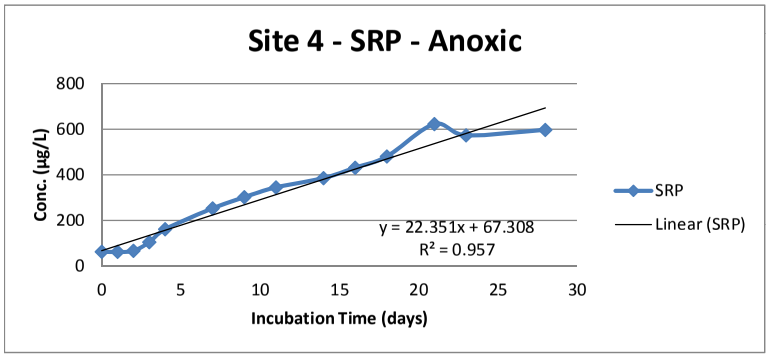

Site 2 - Total P - Aerobic
Conc. (µg/L)
200
150
100
50
0
0 5 10 15 20 25 30 35
Incubation Time (days)
y = 1.2438x + 120.98
R² = 0.9279
Total P
Linear (Total P)

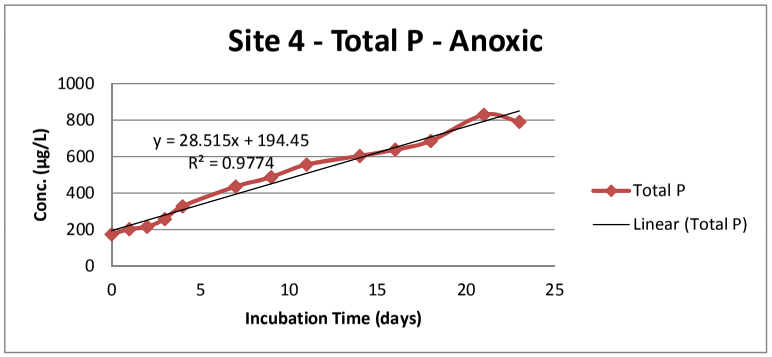

Site 3 - SRP - Anoxic
Conc. (µg/L)
800
600
400
200
0
0 5 10 15 20 25 30
Incubation Time (days)
y = 23.834x + 36.472
R² = 0.9682
SRP
Linear (SRP)

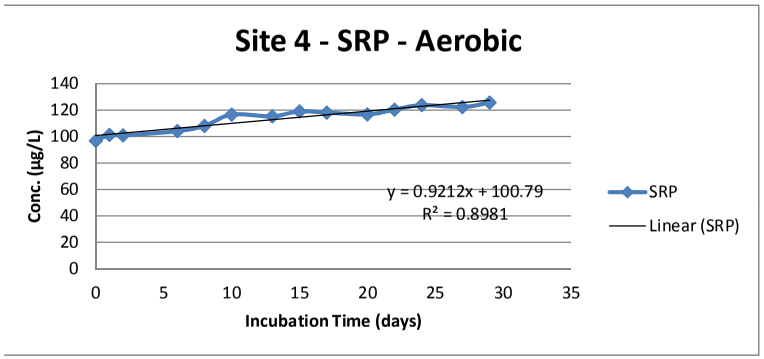

Site 3 - Total P - Anoxic
Conc. (µg/L)
1200
1000
800
600
400
200
0
0 5 10 15 20 25
Incubation Time (days)
y = 34.672x + 192.54
R² = 0.9971
Total P
Linear (Total P)

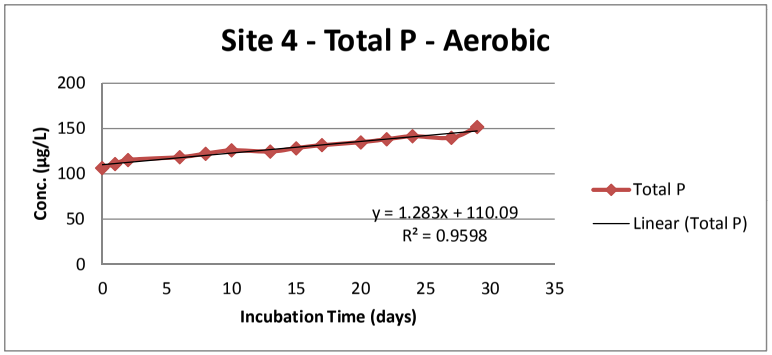

Site 3 - SRP - Aerobic
Conc. (µg/L)
300
250
200
150
100
50
0
0 5 10 15 20 25 30 35
Incubation Time (days)
y = 4.1208x + 107.33
R² = 0.8773
SRP
Linear (SRP)

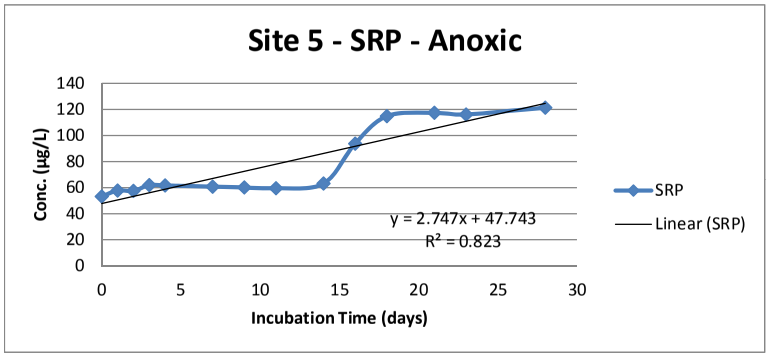

Site 3 - Total P - Aerobic
Conc. (µg/L)
350
300
250
200
150
100
50
0
0 5 10 15 20 25 30 35
Incubation Time (days)
y = 6.0012x + 144.48
R² = 0.9714
Total P
Linear (Total P)

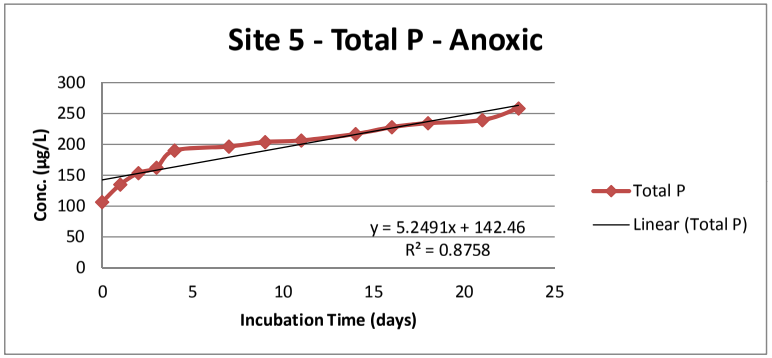

Site 4 - SRP - Anoxic
Conc. (µg/L)
Incubation Time (days)
y = 22.351x + 67.308
R² = 0.957
SRP
Linear (SRP)

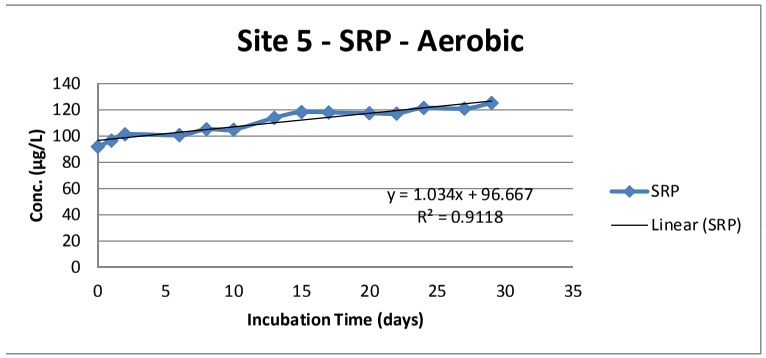

Site 4 - Total P - Anoxic
Conc. (µg/L)
Incubation Time (days)
y = 28.515x + 194.45
R² = 0.9774
Total P
Linear (Total P)

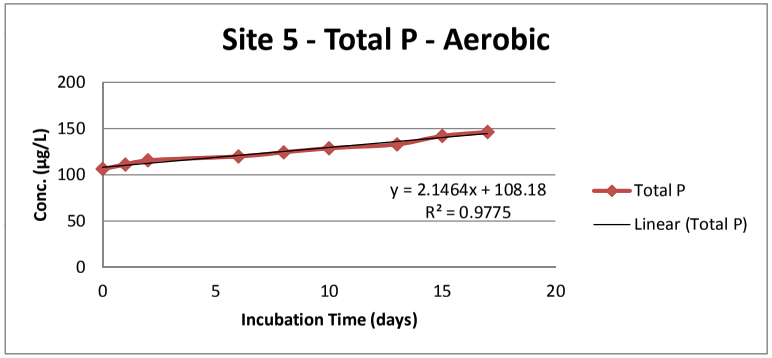

Site 4 - SRP - Aerobic
Conc. (µg/L)
Incubation Time (days)
y = 0.9212x + 100.79
R² = 0.8981
SRP
Linear (SRP)

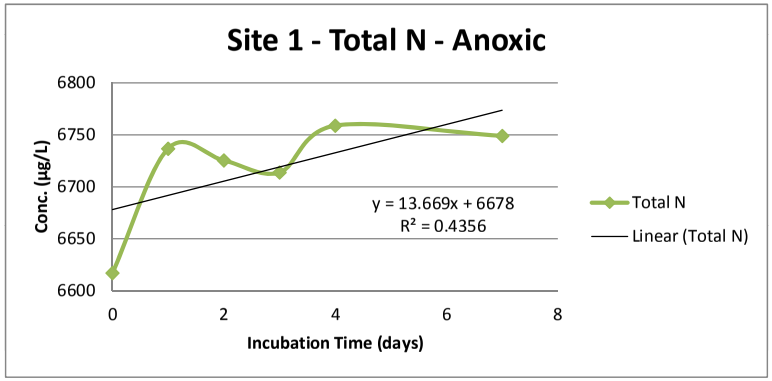

Site 4 - Total P - Aerobic
Conc. (µg/L)
Incubation Time (days)
y = 1.283x + 110.09
R² = 0.9598
Total P
Linear (Total P)

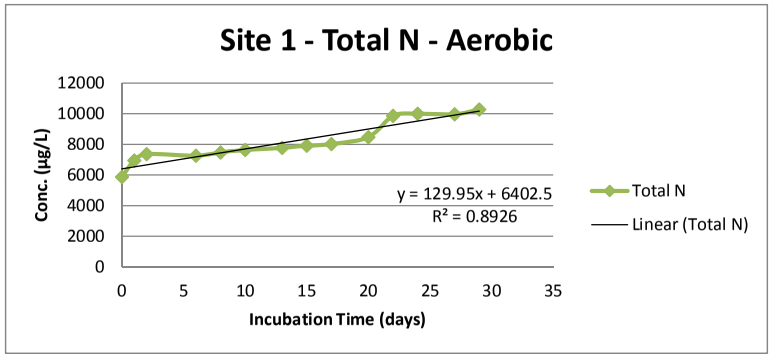

Site 5 - SRP - Anoxic
Conc. (µg/L)
Incubation Time (days)
y = 2.747x + 47.743
R² = 0.823
SRP
Linear (SRP)

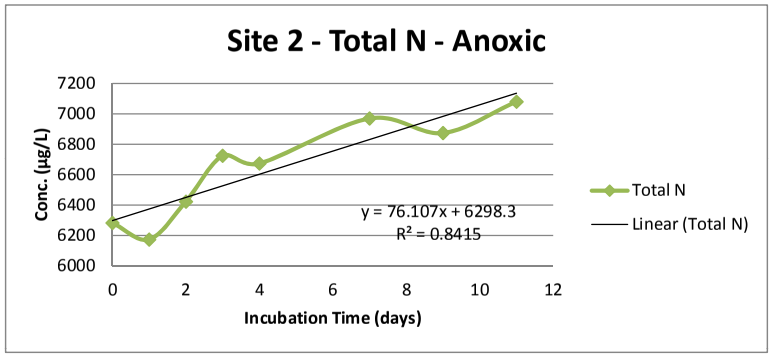

Site 5 - Total P - Anoxic
Conc. (µg/L)
Incubation Time (days)
y = 5.2491x + 142.46
R² = 0.8758
Total P
Linear (Total P)

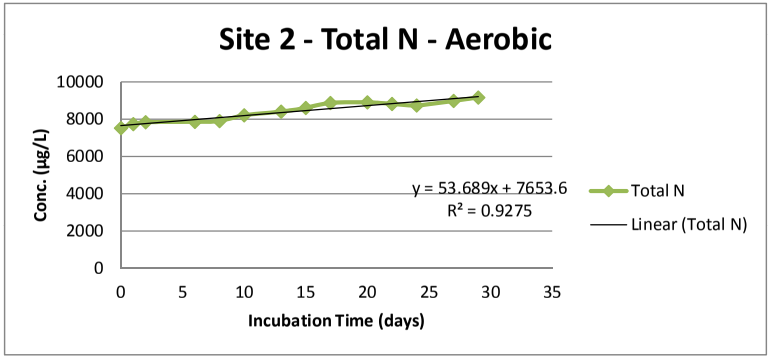

Site 5 - SRP - Aerobic
Conc. (µg/L)
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 1.034x + 96.667
R² = 0.9118
SRP
Linear (SRP)

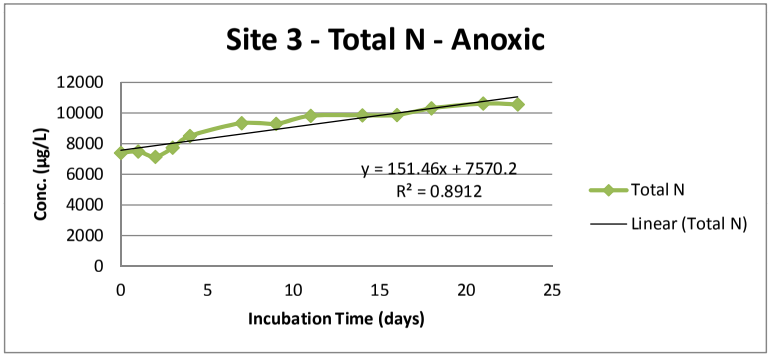

Site 5 - Total P - Aerobic
Conc. (µg/L)
200
150
100
50
0
0
5
10
15
20
Incubation Time (days)
y = 2.1464x + 108.18
R² = 0.9775
Total P
Linear (Total P)

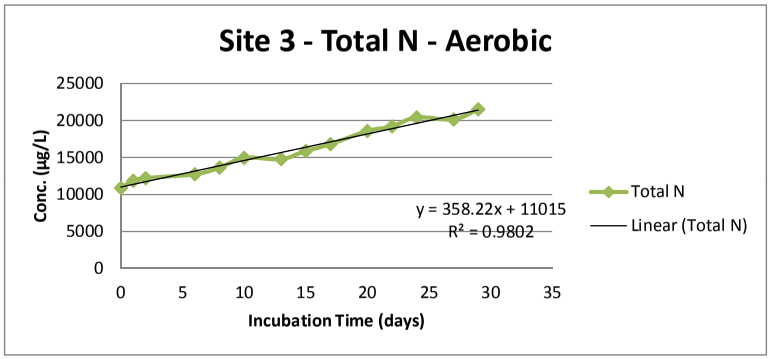

Site 1 - Total N - Anoxic
Conc. (µg/L)
6800
6750
6700
6650
6600
0
2
4
6
8
Incubation Time (days)
y = 13.669x + 6678
R² = 0.4356
Total N
Linear (Total N)

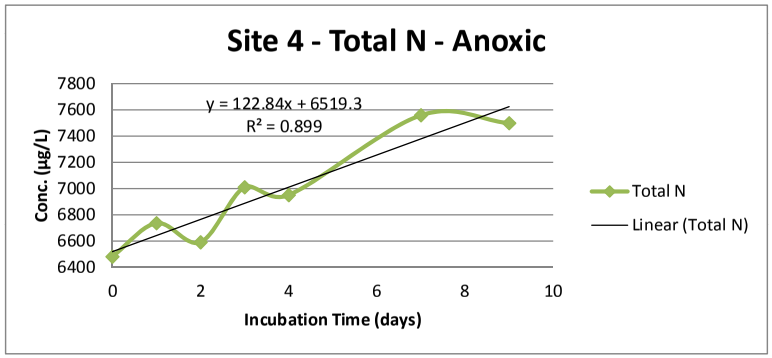

Site 1 - Total N - Aerobic
Conc. (µg/L)
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 129.95x + 6402.5
R² = 0.8926
Total N
Linear (Total N)

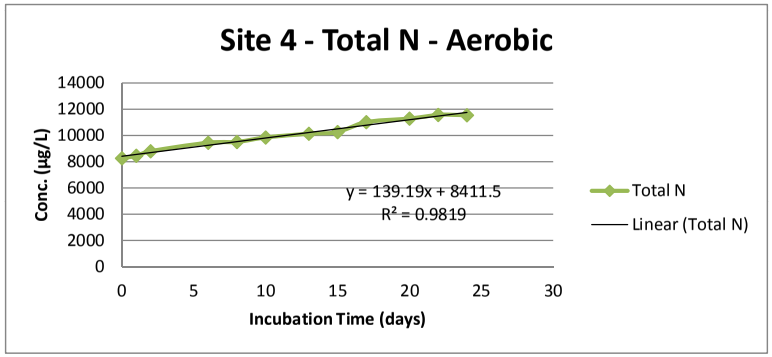

Site 2 - Total N - Anoxic
Conc. (µg/L)
7200
7000
6800
6600
6400
6200
6000
0
2
4
6
8
10
12
Incubation Time (days)
y = 76.107x + 6298.3
R² = 0.8415
Total N
Linear (Total N)

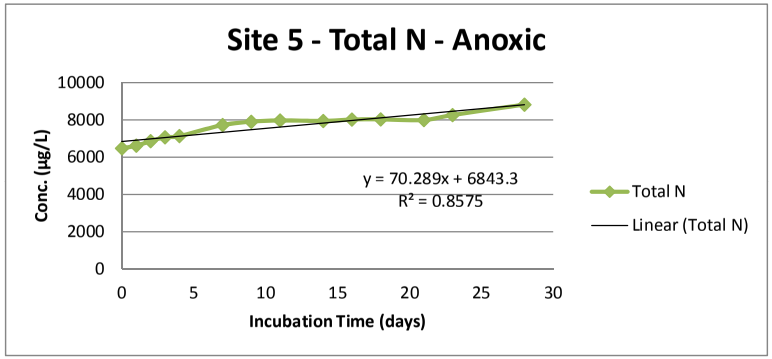

Site 2 - Total N - Aerobic
Conc. (µg/L)
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 53.689x + 7653.6
R² = 0.9275
Total N
Linear (Total N)

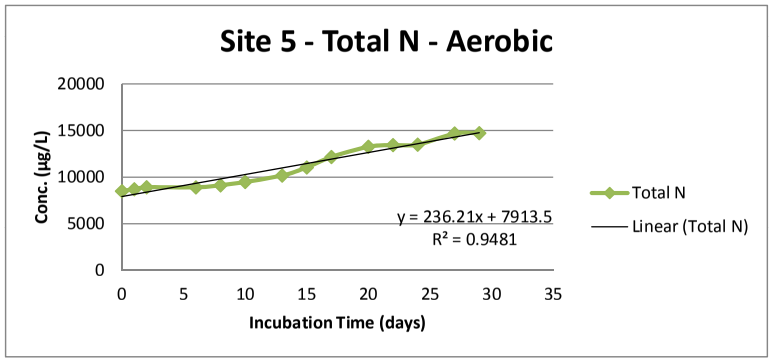

Site 3 - Total N - Anoxic
Conc. (µg/L)
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
Incubation Time (days)
y = 151.46x + 7570.2
R² = 0.8912
Total N
Linear (Total N)


Site 3 - Total N - Aerobic
Conc. (µg/L)
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 358.22x + 11015
R² = 0.9802
Total N
Linear (Total N)


Site 4 - Total N - Anoxic
y = 122.84x + 6519.3
R² = 0.899
Conc. (µg/L)
7800
7600
7400
7200
7000
6800
6600
6400
0
2
4
6
8
10
Incubation Time (days)
Total N
Linear (Total N)


Site 4 - Total N - Aerobic
y = 139.19x + 8411.5
R² = 0.9819
Conc. (µg/L)
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
Incubation Time (days)
Total N
Linear (Total N)


Site 5 - Total N - Anoxic
y = 70.289x + 6843.3
R² = 0.8575
Conc. (µg/L)
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
Incubation Time (days)
Total N
Linear (Total N)


Site 5 - Total N - Aerobic
Conc. (µg/L)
20000
15000
10000
5000
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 236.21x + 7913.5
R² = 0.9481
Total N
Linear (Total N)

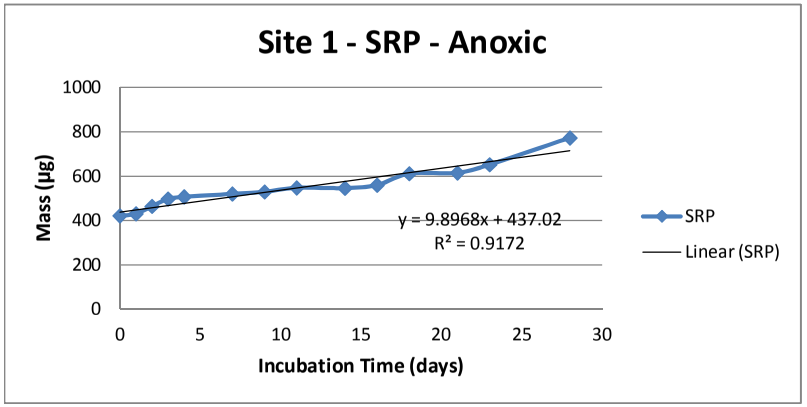
J.2 Trout Lake

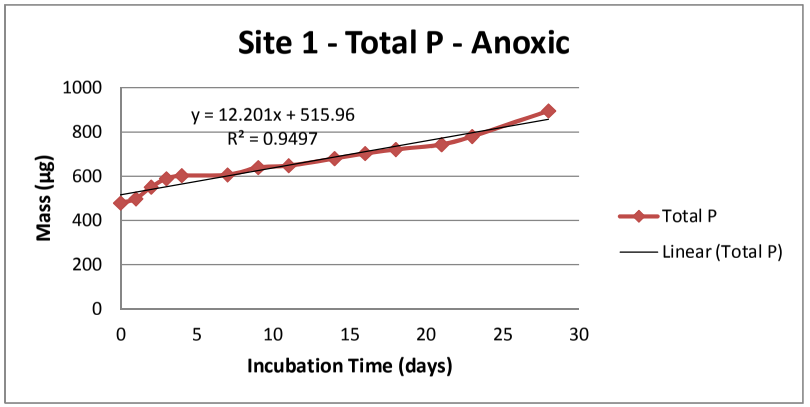
Results of Sediment Benthic Phosphorus Release Rate Studies in Trout Lake

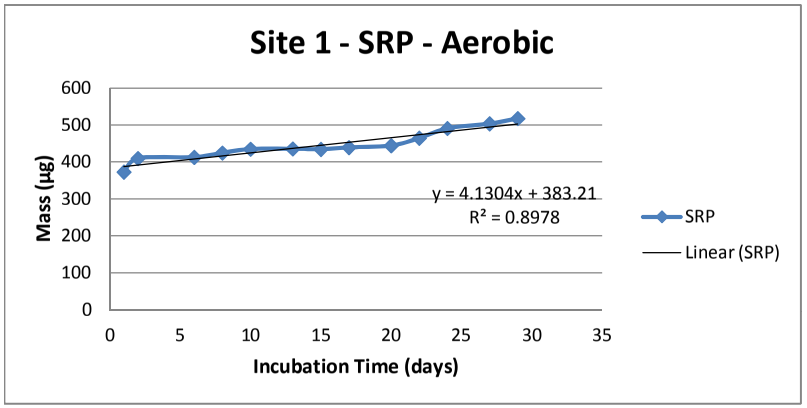
Site	Redox Condition	Date Collected	Time (days)	NH3 (µg/L)	NO_X (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	Volume (L)	Total N (µg)	SRP (µg)	Total P (µg)
Starting water level (inches):			24.00	Ending water level (inches):						23.50				
Trout Lake Site # 1	Anoxic	11/30/15	0	3	859	665	1,527	87	12	99	4.84	7,392	421	479
		12/1/15	1	3	752	818	1,573	89	14	103	4.84	7,609	430	498
		12/2/15	2	4	708	873	1,585	96	18	114	4.83	7,661	464	551
		12/3/15	3	5	676	925	1,606	103	19	122	4.83	7,757	497	589
		12/4/15	4	6	665	952	1,623	105	20	125	4.83	7,833	507	603
		12/7/15	7	9	656	1,032	1,697	108	18	126	4.82	8,172	520	607
		12/9/15	9	11	642	1,104	1,757	110	23	133	4.81	8,448	529	639
		12/11/15	11	22	622	1,165	1,809	114	21	135	4.80	8,685	547	648
		12/14/15	14	27	565	1,229	1,821	114	28	142	4.79	8,723	546	680
		12/16/15	16	27	558	1,236	1,821	117	30	147	4.78	8,710	560	703
		12/18/15	18	33	550	1,263	1,846	128	23	151	4.78	8,816	611	721
		12/21/15	21	58	531	1,471	2,060	129	27	156	4.76	9,816	615	743
		12/23/15	23	70	525	1,482	2,077	137	27	164	4.76	9,882	652	780
		12/28/15	28	98	506	1,543	2,147	163	26	189	4.74	10,176	773	896
Starting water level (inches):			24.00	Ending water level (inches):						21.00				
Trout Lake Site # 1	Aerobic	12/29/15	0	28	928	1,107	2,063	77	18	95	4.84	9,986	373	460
		12/30/15	1	26	956	1,198	2,180	85	18	103	4.82	10,507	410	496
		12/31/15	2	22	1,058	1,233	2,313	86	20	106	4.80	11,100	413	509
		1/4/16	6	22	1,062	1,208	2,292	90	25	115	4.72	10,808	424	542
		1/6/16	8	22	1,064	1,251	2,337	93	28	121	4.67	10,922	435	566
		1/8/16	10	21	1,077	1,268	2,366	94	31	125	4.63	10,959	435	579
		1/11/16	13	21	1,090	1,307	2,418	95	30	125	4.57	11,049	434	571
		1/13/16	15	21	1,101	1,322	2,444	97	30	127	4.53	11,065	439	575
		1/15/16	17	18	1,222	1,423	2,663	99	31	130	4.49	11,946	444	583
		1/18/16	20	17	1,256	1,551	2,824	105	26	131	4.42	12,491	464	579
		1/20/16	22	17	1,285	1,355	2,657	112	30	142	4.38	11,642	491	622
		1/22/16	24	15	1,327	1,355	2,697	116	35	151	4.34	11,704	503	655
		1/25/16	27	3	1,381	1,229	2,613	121	40	161	4.28	11,176	518	689
		1/27/16	29	3	1,410	1,301	2,714	122	42	164	4.24	11,495	517	695
Starting water level (inches):			24.00	Ending water level (inches):						17.50				
Trout Lake Site # 2	Anoxic	11/30/15	0	28	1,274	1,104	2,406	84	24	108	4.84	11,646	407	523
		12/1/15	1	26	1,231	1,241	2,498	82	30	112	4.79	11,975	393	537
		12/2/15	2	26	1,382	1,147	2,555	88	30	118	4.75	12,128	418	560
		12/3/15	3	25	1,391	1,150	2,566	95	30	125	4.70	12,060	447	588
		12/4/15	4	22	1,387	1,256	2,665	101	32	133	4.65	12,401	470	619
		12/7/15	7	22	1,237	1,458	2,717	104	42	146	4.51	12,261	469	659
		12/9/15	9	21	1,401	1,394	2,816	107	43	150	4.42	12,444	473	663
		12/11/15	11	20	1,548	1,338	2,906	112	44	156	4.33	12,570	484	675
		12/14/15	14	20	1,654	1,384	3,058	118	46	164	4.19	12,798	494	686
		12/16/15	16	19	1,731	1,362	3,112	123	45	168	4.09	12,732	503	687
		12/18/15	18	16	1,729	1,422	3,167	130	43	173	4.00	12,661	520	692
		12/21/15	21	7	1,953	1,380	3,340	136	43	179	3.86	12,883	525	690
		12/23/15	23	3	1,924	1,248	3,175	129	53	182	3.76	11,950	486	685
		12/28/15	28	3	1,962	1,265	3,230	123	52	175	3.53	11,401	434	618

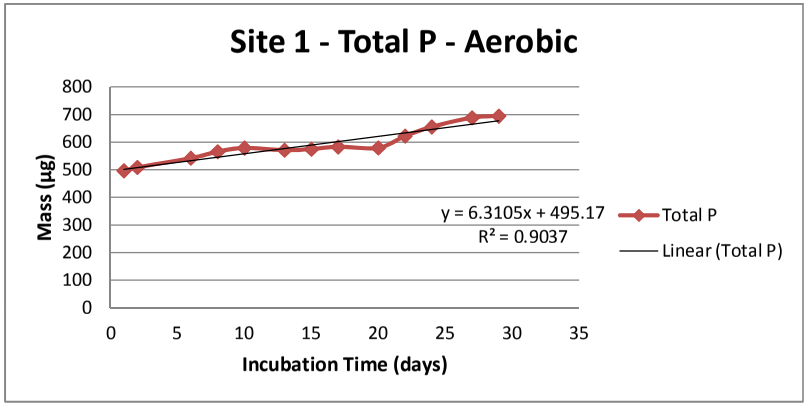
Results of Sediment Benthic Phosphorus Release Rate Studies in Trout Lake

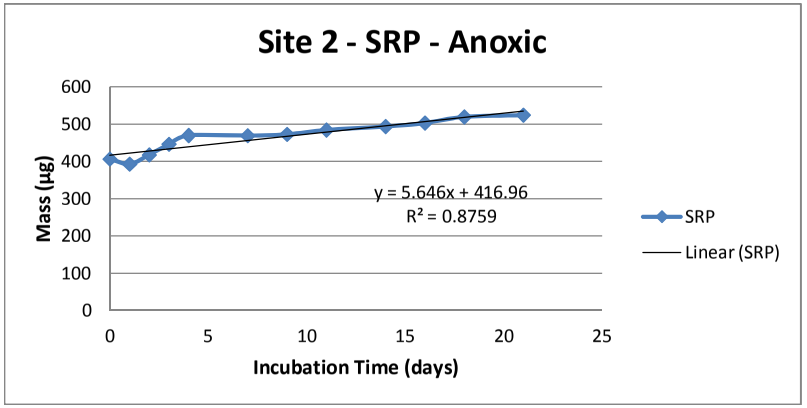
Site	Redox Condition	Date Collected	Time (days)	NH3 (µg/L)	NO_x (µg/L)	Organic N (µg/L)	Total N (µg/L)	SRP (µg/L)	Organic P (µg/L)	Total P (µg/L)	Volume (L)	Total N (µg)	SRP (µg)	Total P (µg)
Starting water level (inches):			24.00	Ending water level (inches):						22.00				
Trot Lake Site # 2	Aerobic	12/29/15	0	3	731	1,410	2,144	122	40	162	4.84	10,378	591	784
		12/30/15	1	3	777	1,375	2,155	124	41	165	4.83	10,401	599	796
		12/31/15	2	3	662	1,498	2,163	126	45	171	4.81	10,410	606	823
		1/4/16	6	3	683	1,559	2,245	127	45	172	4.76	10,680	604	818
		1/6/16	8	3	666	1,565	2,234	129	51	180	4.73	10,565	610	851
		1/8/16	10	9	610	1,617	2,236	135	56	191	4.70	10,512	635	898
		1/11/16	13	10	640	1,654	2,304	137	57	194	4.66	10,736	638	904
		1/13/16	15	21	618	1,677	2,316	138	57	195	4.63	10,728	639	903
		1/15/16	17	22	560	1,748	2,330	139	57	196	4.60	10,728	640	902
		1/18/16	20	24	569	1,785	2,378	141	61	202	4.56	10,849	643	922
		1/20/16	22	34	611	1,824	2,469	145	60	205	4.53	11,196	658	930
		1/22/16	24	35	567	1,890	2,492	147	59	206	4.51	11,231	662	928
		1/25/16	27	68	579	1,857	2,504	155	59	214	4.46	11,180	692	956
		1/27/16	29	99	519	1,800	2,418	170	45	215	4.44	10,729	754	954
Starting water level (inches):			24.00	Ending water level (inches):						23.00				
Trout Lake Site # 3	Anoxic	11/30/15	0	23	1,998	677	2,698	96	49	145	4.84	13,060	465	702
		12/1/15	1	22	1,917	695	2,634	97	51	148	4.83	12,731	469	715
		12/2/15	2	21	1,914	769	2,704	103	47	150	4.83	13,050	497	724
		12/3/15	3	21	1,744	1,057	2,822	104	49	153	4.82	13,599	501	737
		12/4/15	4	20	1,736	1,122	2,878	106	52	158	4.81	13,848	510	760
		12/7/15	7	20	1,733	1,223	2,976	111	54	165	4.79	14,255	532	790
		12/9/15	9	19	1,668	1,337	3,024	114	57	171	4.78	14,442	544	817
		12/11/15	11	17	1,637	1,506	3,160	125	57	182	4.76	15,046	595	867
		12/14/15	14	16	1,632	1,566	3,214	127	59	186	4.74	15,233	602	882
		12/16/15	16	16	1,629	1,610	3,255	129	60	189	4.73	15,381	610	893
		12/18/15	18	15	1,559	1,575	3,149	130	56	186	4.71	14,835	612	876
		12/21/15	21	5	1,542	1,723	3,270	133	55	188	4.69	15,334	624	882
		12/23/15	23	3	1,448	1,672	3,123	134	55	189	4.67	14,600	626	884
		12/28/15	28	3	1,388	1,804	3,195	135	63	198	4.64	14,821	626	918
Starting water level (inches):			24.00	Ending water level (inches):						22.75				
Trout Lake Site # 3	Aerobic	12/29/15	0	163	605	953	1,721	91	22	113	4.84	8,331	440	547
		12/30/15	1	105	609	1,002	1,716	95	19	114	4.83	8,291	459	551
		12/31/15	2	76	625	1,025	1,726	96	19	115	4.82	8,325	463	555
		1/4/16	6	46	629	1,107	1,782	96	22	118	4.79	8,533	460	565
		1/6/16	8	43	644	1,135	1,822	101	21	122	4.77	8,693	482	582
		1/8/16	10	24	653	1,143	1,820	105	20	125	4.75	8,652	499	594
		1/11/16	13	22	667	1,137	1,826	111	21	132	4.73	8,632	525	624
		1/13/16	15	11	667	1,177	1,855	111	26	137	4.71	8,737	523	671
		1/15/16	17	8	670	1,184	1,862	113	23	136	4.69	8,738	530	638
		1/18/16	20	4	678	1,187	1,869	115	27	142	4.67	8,722	537	663
		1/20/16	22	3	722	1,086	1,811	119	29	148	4.65	8,420	553	688
		1/22/16	24	3	723	1,117	1,843	120	27	147	4.63	8,537	556	681
		1/25/16	27	3	749	1,116	1,868	127	30	157	4.61	8,604	585	723
		1/27/16	29	2	801	1,150	1,953	141	29	170	4.59	8,961	647	780

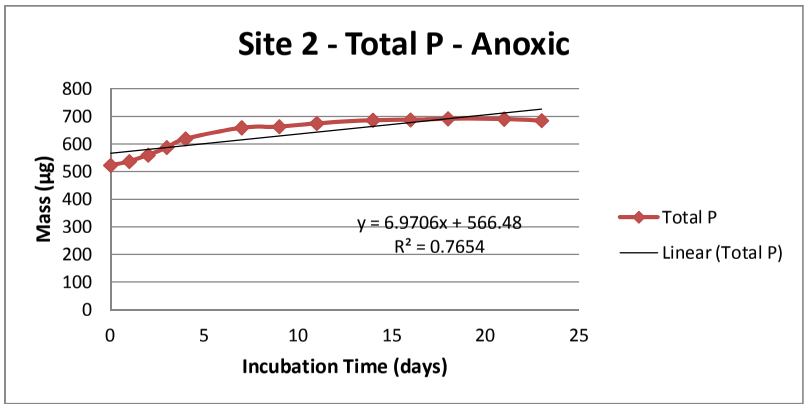

Site 1 - SRP - Anoxic
Mass (µg)
Incubation Time (days)
y = 9.8968x + 437.02
R² = 0.9172
SRP
Linear (SRP)

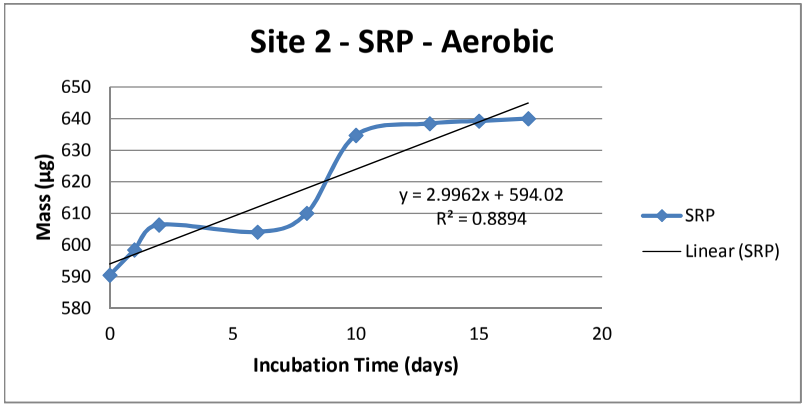

Site 1 - Total P - Anoxic
Mass (µg)
Incubation Time (days)
y = 12.201x + 515.96
R² = 0.9497
Total P
Linear (Total P)

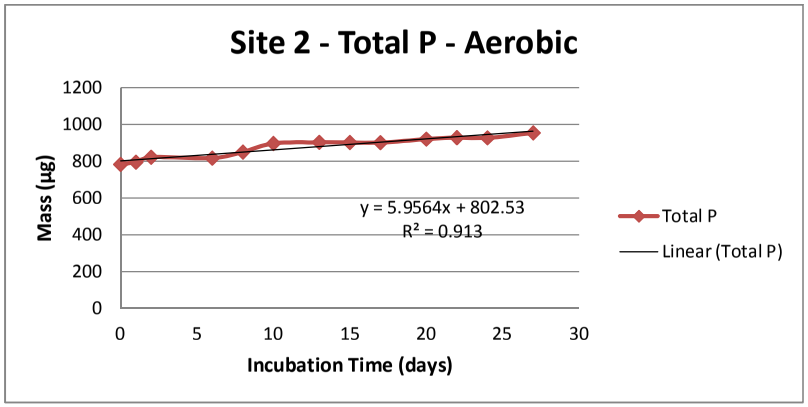

Site 1 - SRP - Aerobic
Mass (µg)
Incubation Time (days)
y = 4.1304x + 383.21
R² = 0.8978
SRP
Linear (SRP)

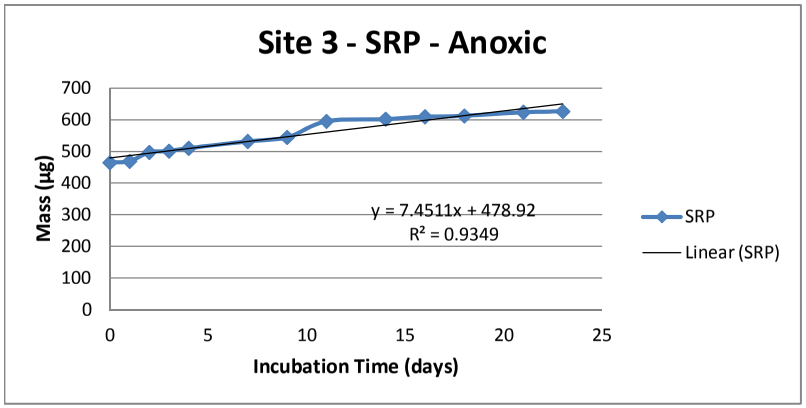

Site 1 - Total P - Aerobic
Mass (µg)
Incubation Time (days)
y = 6.3105x + 495.17
R² = 0.9037
Total P
Linear (Total P)

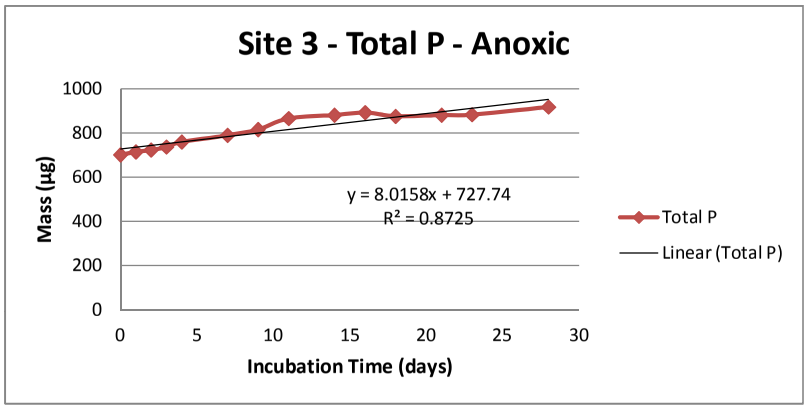

Site 2 - SRP - Anoxic
Mass (µg)
Incubation Time (days)
y = 5.646x + 416.96
R² = 0.8759
SRP
Linear (SRP)

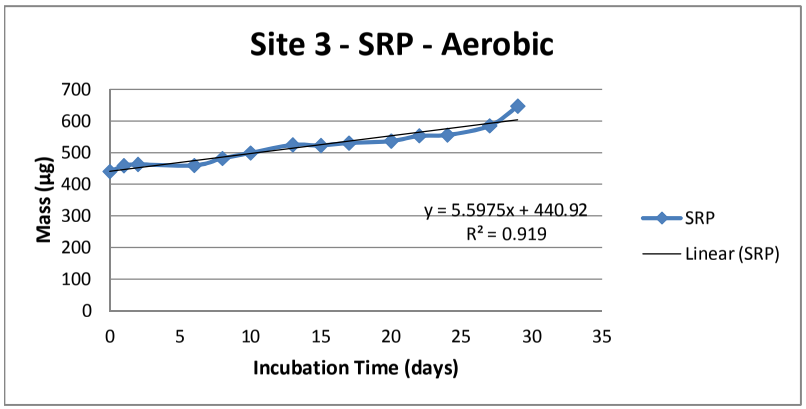

Site 2 - Total P - Anoxic
Mass (µg)
Incubation Time (days)
y = 6.9706x + 566.48
R² = 0.7654
Total P
Linear (Total P)

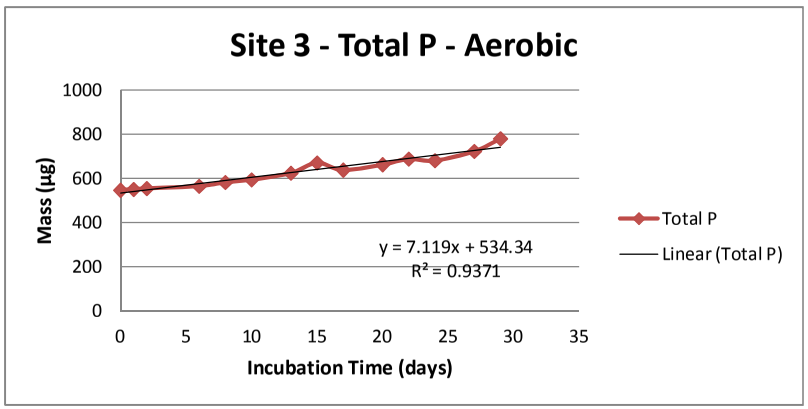

Site 2 - SRP - Aerobic
Mass (µg)
650
640
630
620
610
600
590
580
0
5
10
15
20
Incubation Time (days)
y = 2.9962x + 594.02
R² = 0.8894
SRP
Linear (SRP)

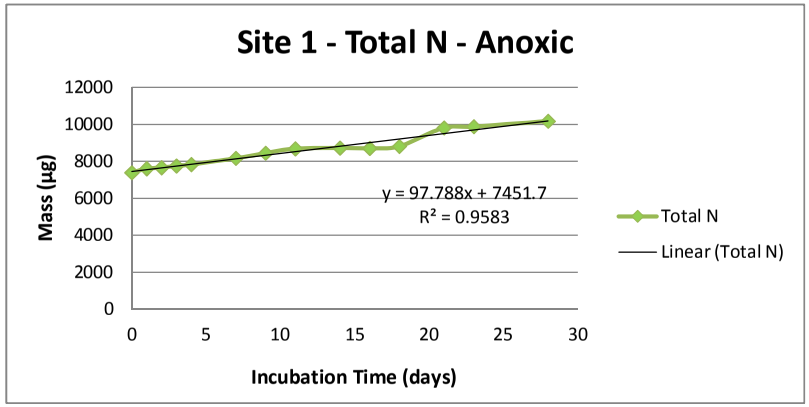

Site 2 - Total P - Aerobic
Mass (µg)
1200
1000
800
600
400
200
0
0
5
10
15
20
25
30
Incubation Time (days)
y = 5.9564x + 802.53
R² = 0.913
Total P
Linear (Total P)

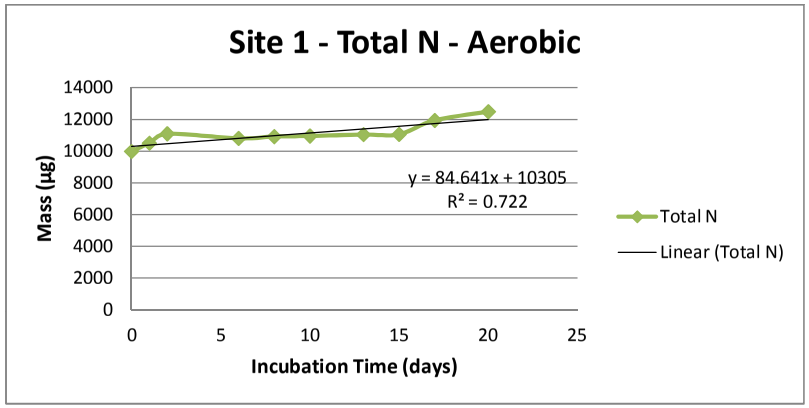

Site 3 - SRP - Anoxic
Mass (µg)
700
600
500
400
300
200
100
0
0
5
10
15
20
25
Incubation Time (days)
y = 7.4511x + 478.92
R² = 0.9349
SRP
Linear (SRP)

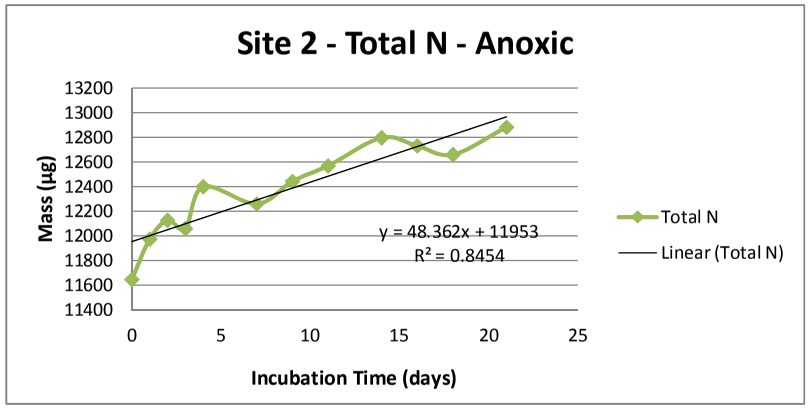

Site 3 - Total P - Anoxic
Mass (µg)
1000
800
600
400
200
0
0
5
10
15
20
25
30
Incubation Time (days)
y = 8.0158x + 727.74
R² = 0.8725
Total P
Linear (Total P)

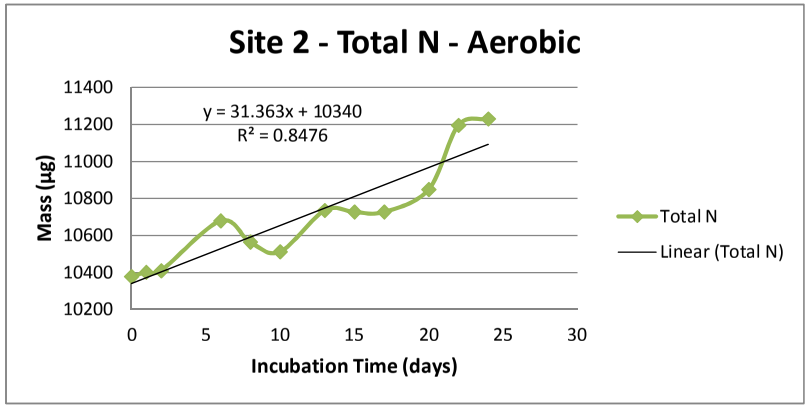

Site 3 - SRP - Aerobic
Mass (µg)
700
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 5.5975x + 440.92
R² = 0.919
SRP
Linear (SRP)

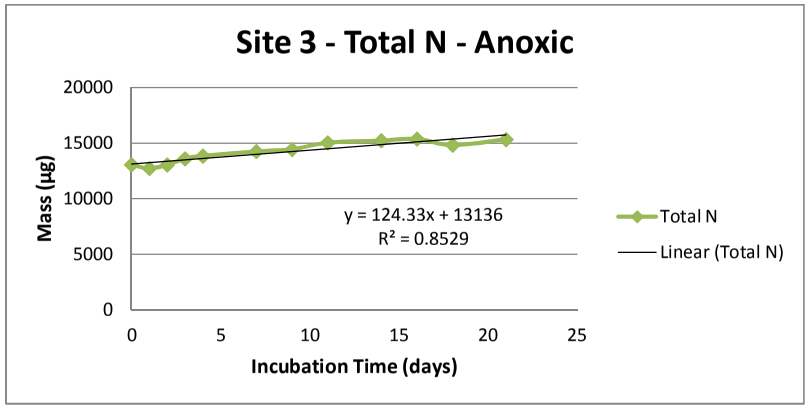

Site 3 - Total P - Aerobic
Mass (µg)
1000
800
600
400
200
0
0
5
10
15
20
25
30
35
Incubation Time (days)
y = 7.119x + 534.34
R² = 0.9371
Total P
Linear (Total P)

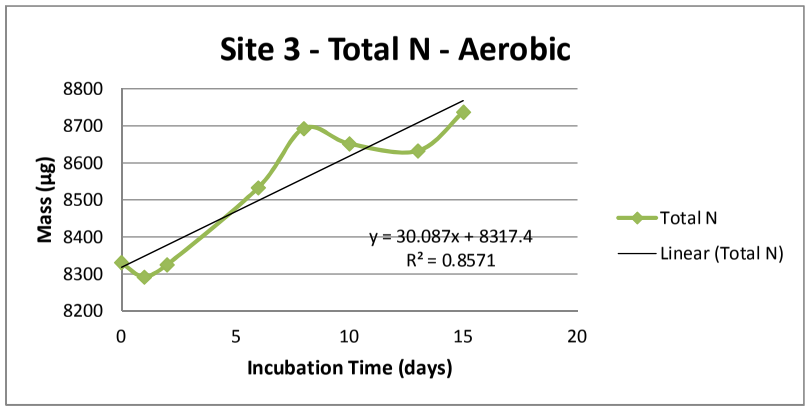

Site 1 - Total N - Anoxic
Mass (µg)
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
Incubation Time (days)
y = 97.788x + 7451.7
R² = 0.9583
Total N
Linear (Total N)


Site 1 - Total N - Aerobic
Mass (µg)
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
Incubation Time (days)
y = 84.641x + 10305
R² = 0.722
Total N
Linear (Total N)


Site 2 - Total N - Anoxic
Mass (µg)
13200
13000
12800
12600
12400
12200
12000
11800
11600
11400
0
5
10
15
20
25
Incubation Time (days)
y = 48.362x + 11953
R² = 0.8454
Total N
Linear (Total N)


Site 2 - Total N - Aerobic
y = 31.363x + 10340
R² = 0.8476
Mass (µg)
11400
11200
11000
10800
10600
10400
10200
0
5
10
15
20
25
30
Incubation Time (days)
Total N
Linear (Total N)


Site 3 - Total N - Anoxic
y = 124.33x + 13136
R² = 0.8529
Mass (µg)
20000
15000
10000
5000
0
0
5
10
15
20
25
Incubation Time (days)
Total N
Linear (Total N)


Site 3 - Total N - Aerobic
y = 30.087x + 8317.4
R² = 0.8571
Mass (µg)
8800
8700
8600
8500
8400
8300
8200
0
5
10
15
20
Incubation Time (days)
Total N
Linear (Total N)

APPENDIX K

WATER QUALITY MODELS

K.1 Lake Yale
K.2 Trout Lake

K.1 Lake Yale

Mass Balance Phosphorus Limitation Model for Lake Yale - Current Conditions

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses										Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Irrigation Withdrawal		Outfall Canal		Total Losses								
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)							
January	0.027	2.94	983	73.9	85	30.0	1.0	0.1	417	8.8	678	1,486	791	0.431	2.43	812	245	7.998	9.9	0.32	428	7.0	1,486	15.0	899	0.938	0.049	0.027	20.4	0.63	71
February	0.027	2.76	923	69.4	80	28.2	0.9	0.1	391	8.3	612	1,395	718	0.417	2.95	986	221	7.298	8.9	0.29	187	6.2	1,395	13.5	865	0.935	0.044	0.027	20.5	0.63	71
March	0.027	4.23	1,414	106	122	43.2	1.4	0.1	600	12.7	678	2,138	840	0.318	4.38	1,464	245	8.146	9.9	0.33	428	14.2	2,138	22.4	625	0.913	0.052	0.028	21.2	0.61	71
April	0.028	2.74	916	68.9	79	28.0	0.9	0.1	389	8.2	656	1,385	761	0.445	5.32	1,779	237	8.018	9.5	0.32	-631	0.0	1,385	8.0	934	0.940	0.047	0.027	20.4	0.63	71
May	0.027	3.28	1,097	82.5	95	33.5	1.1	0.1	465	9.8	678	1,658	804	0.393	5.93	1,983	245	8.260	9.9	0.33	-570	0.0	1,658	8.3	806	0.931	0.049	0.027	20.6	0.63	71
June	0.027	7.18	2,401	181	208	73.3	2.5	0.2	1,018	21.5	656	3,629	932	0.208	5.36	1,792	237	7.895	9.5	0.32	1,600	53.2	3,629	61.1	356	0.856	0.057	0.030	22.9	0.57	73
July	0.030	5.86	1,959	147	170	59.8	2.0	0.2	831	17.6	678	2,962	903	0.247	5.30	1,772	245	8.625	9.9	0.35	945	33.2	2,962	41.9	451	0.883	0.056	0.029	22.1	0.59	72
August	0.029	7.14	2,387	180	207	72.9	2.4	0.2	1,013	21.4	678	3,609	952	0.214	5.01	1,675	245	8.893	9.9	0.36	1,689	61.2	3,609	70.1	370	0.861	0.059	0.030	22.7	0.57	73
September	0.030	6.06	2,026	152	175	61.9	2.1	0.2	859	18.2	656	3,063	889	0.235	4.40	1,471	237	8.581	9.5	0.34	1,355	49.0	3,063	57.6	422	0.876	0.055	0.029	22.3	0.58	72
October	0.029	2.87	960	72.2	83	29.3	1.0	0.1	407	8.6	678	1,451	788	0.440	3.86	1,291	245	8.907	9.9	0.36	-85.2	0.0	1,451	8.9	921	0.939	0.049	0.027	20.4	0.63	71
November	0.027	2.14	715	53.8	62	21.8	0.7	0.1	303	6.4	656	1,082	738	0.553	2.79	933	237	8.197	9.5	0.33	-88.5	0.0	1,082	8.2	1195	0.952	0.045	0.026	20.0	0.64	70
December	0.026	2.47	826	62.1	71	25.2	0.8	0.1	350	7.4	678	1,248	773	0.501	2.25	752	245	8.043	9.9	0.32	251	8.2	1,248	16.3	1070	0.947	0.048	0.027	20.2	0.64	70
Totals:		49.67	16,606	1,249	1437	507	17.0	1.6	7,044	149	7,981	25,104	9,888	0.367	49.98	16,710	2,887	98.9	116	4.0	5,507	232.3	25,104	331.2	743	0.914	0.61	0.028	21.2	0.61	71

Phosphorus Sedimentation Coefficient (σ): 20

0.028 21.6 0.76 69

Mass Balance Phosphorus Limitation Model for Lake Yale - Detention Pond for Sub-Basins 12 and 13

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses										Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Irrigation Withdrawal		Outfall Canal		Total Losses								
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)							
January	0.026	2.94	983	73.9	85	25.1	1.0	0.1	417	8.8	678	1,486	786	0.428	2.43	812	245	7.957	9.9	0.32	428	7.0	1,486	14.9	899	0.938	0.048	0.027	20.3	0.64	70
February	0.027	2.76	923	69.4	80	23.5	0.9	0.1	391	8.3	612	1,395	714	0.414	2.95	986	221	7.256	8.9	0.29	187	6.1	1,395	13.4	865	0.935	0.044	0.027	20.4	0.63	70
March	0.027	4.23	1,414	106	122	36.1	1.4	0.1	600	12.7	678	2,138	833	0.316	4.38	1,464	245	8.094	9.9	0.33	428	14.1	2,138	22.2	625	0.913	0.051	0.028	21.0	0.62	71
April	0.028	2.74	916	68.9	79	23.4	0.9	0.1	389	8.2	656	1,385	757	0.443	5.32	1,779	237	7.958	9.5	0.32	-631	0.0	1,385	8.0	934	0.940	0.047	0.027	20.3	0.64	70
May	0.027	3.28	1,097	82.5	95	28.0	1.1	0.1	465	9.8	678	1,658	798	0.390	5.93	1,983	245	8.200	9.9	0.33	-570	0.0	1,658	8.2	806	0.931	0.049	0.027	20.5	0.63	71
June	0.027	7.18	2,401	181	208	61.2	2.5	0.2	1,018	21.5	656	3,629	919	0.205	5.36	1,792	237	7.844	9.5	0.32	1,600	52.9	3,629	60.7	356	0.856	0.057	0.029	22.6	0.58	73
July	0.029	5.86	1,959	147	170	50.0	2.0	0.2	831	17.6	678	2,962	893	0.244	5.30	1,772	245	8.538	9.9	0.34	945	32.9	2,962	41.4	451	0.883	0.055	0.029	21.8	0.60	72
August	0.029	7.14	2,387	180	207	60.9	2.4	0.2	1,013	21.4	678	3,609	940	0.211	5.01	1,675	245	8.787	9.9	0.35	1,689	60.5	3,609	69.3	370	0.861	0.058	0.029	22.4	0.58	73
September	0.029	6.06	2,026	152	175	51.7	2.1	0.2	859	18.2	656	3,063	878	0.232	4.40	1,471	237	8.480	9.5	0.34	1,355	48.4	3,063	56.9	422	0.876	0.054	0.029	22.0	0.59	72
October	0.029	2.87	960	72.2	83	24.5	1.0	0.1	407	8.6	678	1,451	783	0.437	3.86	1,291	245	8.799	9.9	0.35	-85.2	0.0	1,451	8.8	921	0.939	0.048	0.027	20.3	0.64	70
November	0.027	2.14	715	53.8	62	18.2	0.7	0.1	303	6.4	656	1,082	735	0.550	2.79	933	237	8.124	9.5	0.33	-88.5	0.0	1,082	8.1	1195	0.952	0.045	0.026	19.9	0.65	70
December	0.026	2.47	826	62.1	71	21.1	0.8	0.1	350	7.4	678	1,248	768	0.499	2.25	752	245	7.998	9.9	0.32	251	8.2	1,248	16.2	1070	0.947	0.047	0.026	20.1	0.64	70
Totals:		49.67	16,606	1,249	1437	423	17.0	1.6	7,044	149	7,981	25,104	9,804	0.364	49.98	16,710	2,887	98.0	116	3.9	5,507	230.1	25,104	328.2	743	0.914	0.60	0.028	21.0	0.62	71

Detention Pond Annual TP Removal (kg): 83.6

Phosphorus Sedimentation Coefficient (σ): 20

Mass Balance Phosphorus Limitation Model for Lake Yale - Sediment Inactivation

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses										Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Irrigation Withdrawal		Outfall Canal		Total Losses								
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)							
January	0.008	2.94	983	73.9	85	30.0	1.0	0.1	417	1.8	136	1,486	241	0.132	2.43	812	245	2.290	9.9	0.09	428	2.0	1,486	4.3	899	0.938	0.015	0.008	5.8	1.79	45
February	0.008	2.76	923	69.4	80	28.2	0.9	0.1	391	1.7	122	1,395	222	0.129	2.95	986	221	2.174	8.9	0.09	187	1.8	1,395	4.0	865	0.935	0.014	0.008	5.9	1.77	45
March	0.008	4.23	1,414	106	122	43.2	1.4	0.1	600	2.5	136	2,138	288	0.109	4.38	1,464	245	2.501	9.9	0.10	428	4.4	2,138	6.9	625	0.913	0.018	0.010	6.8	1.59	48
April	0.010	2.74	916	68.9	79	28.0	0.9	0.1	389	1.6	131	1,385	230	0.134	5.32	1,779	237	2.613	9.5	0.10	-631	0.0	1,385	2.6	934	0.940	0.014	0.008	5.7	1.81	44
May	0.008	3.28	1,097	82.5	95	33.5	1.1	0.1	465	2.0	136	1,658	254	0.124	5.93	1,983	245	2.665	9.9	0.11	-570	0.0	1,658	2.7	806	0.931	0.016	0.009	6.1	1.73	46
June	0.009	7.18	2,401	181	208	73.3	2.5	0.2	1,018	4.3	131	3,629	390	0.087	5.36	1,792	237	2.438	9.5	0.10	1,600	16.4	3,629	18.9	356	0.856	0.024	0.012	9.1	1.27	54
July	0.012	5.86	1,959	147	170	59.8	2.0	0.2	831	3.5	136	2,962	346	0.095	5.30	1,772	245	3.186	9.9	0.13	945	12.3	2,962	15.5	451	0.883	0.021	0.011	8.0	1.41	51
August	0.011	7.14	2,387	180	207	72.9	2.4	0.2	1,013	4.3	136	3,609	393	0.088	5.01	1,675	245	3.569	9.9	0.14	1,689	24.6	3,609	28.1	370	0.861	0.024	0.012	8.9	1.29	53
September	0.012	6.06	2,026	152	175	61.9	2.1	0.2	859	3.6	131	3,063	349	0.092	4.40	1,471	237	3.417	9.5	0.14	1,355	19.5	3,063	22.9	422	0.876	0.022	0.011	8.3	1.37	52
October	0.011	2.87	960	72.2	83	29.3	1.0	0.1	407	1.7	136	1,451	239	0.133	3.86	1,291	245	3.587	9.9	0.14	-85.2	0.0	1,451	3.6	921	0.939	0.015	0.008	5.8	1.80	45
November	0.008	2.14	715	53.8	62	21.8	0.7	0.1	303	1.3	131	1,082	208	0.156	2.79	933	237	2.869	9.5	0.12	-88.5	0.0	1,082	2.9	1195	0.952	0.013	0.007	5.2	1.93	43
December	0.007	2.47	826	62.1	71	25.2	0.8	0.1	350	1.5	136	1,248	224	0.146	2.25	752	245	2.354	9.9	0.09	251	2.4	1,248	4.8	1070	0.947	0.014	0.008	5.5	1.88	43
Totals:		49.67	16,606	1,249	1437	507	17.0	1.6	7,044	29.8	1,596	25,104	3,384	0.119	49.98	16,710	2,887	33.7	116	1.4	5,507	83.4	25,104	117.1	743	0.914	0.21	0.009	6.9	1.62	48

Phosphorus Sedimentation Coefficient (σ): 20

Mass Balance Phosphorus Limitation Model for Lake Yale - Sediment Inactivation + Sub-Basins 12 & 13 Detention Pond

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses										Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling	Total Inputs			Evaporation		Deep Recharge		Irrigation Withdrawal		Outfall Canal		Total Losses								
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(kg)	(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)							
January	0.008	2.94	983	73.9	85	25.1	1.0	0.1	417	1.8	136	1,486	236	0.129	2.43	812	245	2.249	9.9	0.09	428	2.0	1,486	4.2	899	0.938	0.015	0.008	5.7	1.82	44
February	0.008	2.76	923	69.4	80	23.5	0.9	0.1	391	1.7	122	1,395	217	0.126	2.95	986	221	2.132	8.9	0.09	187	1.8	1,395	3.9	865	0.935	0.013	0.008	5.8	1.80	45
March	0.008	4.23	1,414	106	122	36.1	1.4	0.1	600	2.5	136	2,138	281	0.106	4.38	1,464	245	2.449	9.9	0.10	428	4.3	2,138	6.7	625	0.913	0.017	0.009	6.6	1.63	47
April	0.009	2.74	916	68.9	79	23.4	0.9	0.1	389	1.6	131	1,385	225	0.132	5.32	1,779	237	2.553	9.5	0.10	-631	0.0	1,385	2.6	934	0.940	0.014	0.008	5.6	1.84	44
May	0.008	3.28	1,097	82.5	95	28.0	1.1	0.1	465	2.0	136	1,658	248	0.121	5.93	1,983	245	2.604	9.9	0.10	-570	0.0	1,658	2.6	806	0.931	0.015	0.008	6.0	1.76	45
June	0.008	7.18	2,401	181	208	61.2	2.5	0.2	1,018	4.3	131	3,629	377	0.084	5.36	1,792	237	2.387	9.5	0.10	1,600	16.1	3,629	18.5	356	0.856	0.023	0.012	8.8	1.30	53
July	0.012	5.86	1,959	147	170	50.0	2.0	0.2	831	3.5	136	2,962	337	0.092	5.30	1,772	245	3.099	9.9	0.12	945	11.9	2,962	15.0	451	0.883	0.021	0.011	7.8	1.44	50
August	0.011	7.14	2,387	180	207	60.9	2.4	0.2	1,013	4.3	136	3,609	380	0.085	5.01	1,675	245	3.462	9.9	0.14	1,689	23.8	3,609	27.3	370	0.861	0.023	0.012	8.6	1.33	53
September	0.012	6.06	2,026	152	175	51.7	2.1	0.2	859	3.6	131	3,063	339	0.090	4.40	1,471	237	3.316	9.5	0.13	1,355	18.9	3,063	22.2	422	0.876	0.021	0.011	8.0	1.40	51
October	0.011	2.87	960	72.2	83	24.5	1.0	0.1	407	1.7	136	1,451	234	0.131	3.86	1,291	245	3.480	9.9	0.14	-85.2	0.0	1,451	3.5	921	0.939	0.014	0.008	5.6	1.83	44
November	0.008	2.14	715	53.8	62	18.2	0.7	0.1	303	1.3	131	1,082	205	0.153	2.79	933	237	2.795	9.5	0.11	-88.5	0.0	1,082	2.8	1195	0.952	0.013	0.007	5.1	1.96	42
December	0.007	2.47	826	62.1	71	21.1	0.8	0.1	350	1.5	136	1,248	220	0.143	2.25	752	245	2.310	9.9	0.09	251	2.4	1,248	4.7	1070	0.947	0.014	0.008	5.3	1.91	43
Totals:		49.67	16,606	1,249	1437	423	17.0	1.6	7,044	29.8	1,596	25,104	3,300	0.116	49.98	16,710	2,887	32.8	116	1.3	5,507	81.2	25,104	114.1	743	0.914	0.20	0.009	6.7	1.65	47

Detention Pond Annual TP Removal (kg): 83.6

Phosphorus Sedimentation Coefficient (σ): 20

K.2 Trout Lake

Mass Balance Phosphorus Limitation Model for Trout Lake - Current Conditions

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses								Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Outfall to Eustis		Total Losses							
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)							
January	0.235	2.94	26.0	2.0	71	12.7	0.01	0.01	7.2	6.4	14.6	104	36	0.277	2.43	21.5	1.1	0.313	81.7	24.04	104	24.35	240	0.185	0.083	0.226	60.7	0.57	94
February	0.226	2.76	24.4	1.8	67	11.9	0.01	0.01	6.7	6.0	13.2	98	33	0.273	2.95	26.1	1.0	0.285	70.8	20.14	98	20.42	231	0.179	0.077	0.224	60.2	0.57	93
March	0.224	4.23	37.4	2.8	102	18.2	0.01	0.01	10.3	9.2	14.6	150	45	0.242	4.38	38.7	1.5	0.425	109.7	30.45	150	30.88	167	0.136	0.105	0.209	56.1	0.61	92
April	0.209	2.74	24.2	1.8	66	11.8	0.01	0.01	6.7	6.0	14.1	97	34	0.281	5.32	47.0	1.0	0.265	49.1	13.14	97	13.41	249	0.191	0.079	0.228	61.3	0.56	94
May	0.228	3.28	29.0	2.2	79	14.1	0.01	0.01	8.0	7.1	14.6	116	38	0.265	5.93	52.4	1.2	0.321	62.7	16.92	116	17.24	215	0.169	0.089	0.220	59.2	0.58	93
June	0.220	7.18	63.4	4.8	174	30.9	0.01	0.01	17.5	15.6	14.1	255	65	0.208	5.36	47.3	2.6	0.720	204.6	56.59	255	57.31	95	0.082	0.153	0.191	51.0	0.67	90
July	0.191	5.86	51.8	3.9	142	25.2	0.01	0.01	14.3	12.7	14.6	208	57	0.220	5.30	46.8	2.1	0.540	158.8	40.35	208	40.89	120	0.102	0.132	0.198	52.8	0.65	91
August	0.198	7.14	63.1	4.8	173	30.8	0.01	0.01	17.4	15.5	14.6	253	66	0.210	5.01	44.3	2.6	0.621	206.3	49.54	253	50.16	99	0.085	0.153	0.192	51.2	0.67	90
September	0.192	6.06	53.5	4.0	147	26.1	0.01	0.01	14.8	13.2	14.1	215	57	0.217	4.40	38.9	2.2	0.529	173.8	41.84	215	42.37	113	0.096	0.134	0.196	52.3	0.66	90
October	0.196	2.87	25.4	1.9	69	12.4	0.01	0.01	7.0	6.2	14.6	102	35	0.280	3.86	34.1	1.0	0.249	66.6	15.96	102	16.20	246	0.188	0.082	0.227	61.1	0.56	94
November	0.227	2.14	18.9	1.4	52	9.2	0.00	0.00	5.2	4.7	14.1	76	29	0.314	2.79	24.6	0.8	0.202	50.4	13.17	76	13.37	319	0.232	0.069	0.242	65.3	0.53	95
December	0.242	2.47	21.8	1.6	60	10.6	0.00	0.00	6.0	5.4	14.6	88	32	0.299	2.25	19.9	0.9	0.259	66.8	19.32	88	19.58	285	0.212	0.075	0.235	63.4	0.54	95
Totals:		49.67	439	33.1	1201	214	0.10	0.10	121	108	172	1,761	527	0.257	49.98	441	18.0	4.73	1301	341.44	1,761	346.17	198	0.155	1.23	0.216	57.6	0.60	92

Phosphorus Sedimentation Coefficient (σ): 0.8

0.218 55.4 0.66

Mass Balance Phosphorus Limitation Model for Trout Lake - Hick's Ditch Treatment System

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses								Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Outfall to Eustis		Total Losses							
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)							
January	0.193	2.94	26.0	2.0	71	5.7	0.01	0.01	7.2	6.4	14.6	104	29	0.223	2.43	21.5	1.1	0.258	81.7	19.81	104	20.07	240	0.185	0.067	0.182	48.3	0.71	89
February	0.182	2.76	24.4	1.8	67	5.4	0.01	0.01	6.7	6.0	13.2	98	26	0.219	2.95	26.1	1.0	0.231	70.8	16.37	98	16.60	231	0.179	0.062	0.180	47.7	0.72	88
March	0.180	4.23	37.4	2.8	102	8.3	0.01	0.01	10.3	9.2	14.6	150	35	0.189	4.38	38.7	1.5	0.342	109.7	24.49	150	24.83	167	0.136	0.081	0.163	43.0	0.79	86
April	0.163	2.74	24.2	1.8	66	5.4	0.01	0.01	6.7	6.0	14.1	97	27	0.227	5.32	47.0	1.0	0.210	49.1	10.39	97	10.60	249	0.191	0.064	0.184	49.0	0.70	89
May	0.184	3.28	29.0	2.2	79	6.4	0.01	0.01	8.0	7.1	14.6	116	30	0.211	5.93	52.4	1.2	0.255	62.7	13.43	116	13.68	215	0.169	0.071	0.176	46.6	0.73	88
June	0.176	7.18	63.4	4.8	174	14.0	0.01	0.01	17.5	15.6	14.1	255	49	0.155	5.36	47.3	2.6	0.578	204.6	45.44	255	46.01	95	0.082	0.113	0.142	37.1	0.91	83
July	0.142	5.86	51.8	3.9	142	11.4	0.01	0.01	14.3	12.7	14.6	208	43	0.167	5.30	46.8	2.1	0.416	158.8	31.12	208	31.54	120	0.102	0.100	0.150	39.3	0.86	84
August	0.150	7.14	63.1	4.8	173	13.9	0.01	0.01	17.4	15.5	14.6	253	49	0.156	5.01	44.3	2.6	0.465	206.3	37.10	253	37.56	99	0.085	0.114	0.143	37.5	0.90	83
September	0.143	6.06	53.5	4.0	147	11.8	0.01	0.01	14.8	13.2	14.1	215	43	0.163	4.40	38.9	2.2	0.397	173.8	31.38	215	31.77	113	0.096	0.101	0.147	38.6	0.87	84
October	0.147	2.87	25.4	1.9	69	5.6	0.01	0.01	7.0	6.2	14.6	102	28	0.226	3.86	34.1	1.0	0.186	66.6	11.93	102	12.12	246	0.188	0.066	0.183	48.7	0.70	89
November	0.183	2.14	18.9	1.4	52	4.2	0.00	0.00	5.2	4.7	14.1	76	24	0.261	2.79	24.6	0.8	0.158	50.4	10.29	76	10.45	319	0.232	0.057	0.200	53.5	0.64	91
December	0.200	2.47	21.8	1.6	60	4.8	0.00	0.00	6.0	5.4	14.6	88	26	0.245	2.25	19.9	0.9	0.212	66.8	15.81	88	16.02	285	0.212	0.062	0.193	51.4	0.67	90
Totals:		49.67	439	33.1	1201	97	0.10	0.10	121	108	172	1,761	410	0.203	49.98	441	18.0	3.71	1301	267.56	1,761	271.26	198	0.155	0.96	0.170	44.8	0.77	87

Hick's Ditch BMP Annual TP Removal (kg): 117.0

Phosphorus Sedimentation Coefficient (σ): 0.8

Mass Balance Phosphorus Limitation Model for Trout Lake - Sediment Inactivation

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses								Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Outfall to Eustis		Total Losses								
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)						
January	0.119	2.94	26.0	2.0	71	12.7	0.01	0.01	7.2	1.3	2.9	104	19	0.146	2.43	21.5	1.1	0.156	81.7	11.95	104	12.10	240	0.185	0.044	0.119	30.9	1.08	79
February	0.119	2.76	24.4	1.8	67	11.9	0.01	0.01	6.7	1.2	2.6	98	18	0.146	2.95	26.1	1.0	0.147	70.8	10.40	98	10.55	231	0.179	0.041	0.119	31.0	1.08	79
March	0.119	4.23	37.4	2.8	102	18.2	0.01	0.01	10.3	1.8	2.9	150	26	0.139	4.38	38.7	1.5	0.226	109.7	16.17	150	16.40	167	0.136	0.060	0.120	31.3	1.07	79
April	0.120	2.74	24.2	1.8	66	11.8	0.01	0.01	6.7	1.2	2.8	97	18	0.147	5.32	47.0	1.0	0.147	49.1	7.28	97	7.43	249	0.191	0.041	0.119	30.9	1.08	79
May	0.119	3.28	29.0	2.2	79	14.1	0.01	0.01	8.0	1.4	2.9	116	21	0.144	5.93	52.4	1.2	0.176	62.7	9.28	116	9.45	215	0.169	0.048	0.120	31.0	1.07	79
June	0.120	7.18	63.4	4.8	174	30.9	0.01	0.01	17.5	3.1	2.8	255	42	0.133	5.36	47.3	2.6	0.384	204.6	30.17	255	30.55	95	0.082	0.097	0.122	31.6	1.06	79
July	0.122	5.86	51.8	3.9	142	25.2	0.01	0.01	14.3	2.5	2.9	208	35	0.135	5.30	46.8	2.1	0.316	158.8	23.66	208	23.98	120	0.102	0.081	0.121	31.5	1.06	79
August	0.121	7.14	63.1	4.8	173	30.8	0.01	0.01	17.4	3.1	2.9	253	42	0.133	5.01	44.3	2.6	0.388	206.3	30.94	253	31.33	99	0.085	0.097	0.122	31.6	1.06	79
September	0.122	6.06	53.5	4.0	147	26.1	0.01	0.01	14.8	2.6	2.8	215	36	0.134	4.40	38.9	2.2	0.329	173.8	26.05	215	26.38	113	0.096	0.083	0.121	31.5	1.06	79
October	0.121	2.87	25.4	1.9	69	12.4	0.01	0.01	7.0	1.2	2.9	102	18	0.147	3.86	34.1	1.0	0.156	66.6	9.99	102	10.15	246	0.188	0.043	0.119	30.9	1.08	79
November	0.119	2.14	18.9	1.4	52	9.2	0.00	0.00	5.2	0.9	2.8	76	14	0.154	2.79	24.6	0.8	0.115	50.4	7.49	76	7.61	319	0.232	0.034	0.118	30.6	1.09	79
December	0.118	2.47	21.8	1.6	60	10.6	0.00	0.00	6.0	1.1	2.9	88	16	0.151	2.25	19.9	0.9	0.131	66.8	9.79	88	9.92	285	0.212	0.038	0.119	30.8	1.08	79
Totals:		49.67	439	33.1	1201	214	0.10	0.10	121	22	34.4	1,761	303	0.142	49.98	441	18.0	2.67	1301	193.17	1,761	195.84	198	0.155	0.71	0.120	31.2	1.07	79

Phosphorus Sedimentation Coefficient (σ): 0.8

Mass Balance Phosphorus Limitation Model for Trout Lake - Sediment Inactivation + Hick's Ditch Treatment System

Month	Initial P Conc. (mg/l)	Hydrologic and Mass Inputs													Hydrologic and Mass Losses								Mean Detention Time (days)	TP Retention Coefficient	Areal P Loading (g/m^2)	Final Lake P Conc. (mg/l)	Chyl-a Conc. (mg/m^3)	Secchi Disk Depth (m)	TSI Value
		Direct Precipitation			Stormwater		Overland Flow		G.W. Seepage		Internal Recycling (kg)	Total Inputs			Evaporation		Deep Recharge		Outfall to Eustis		Total Losses								
		(in)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)		(ac-ft)	(kg)	(mg/l)	(in)	(ac-ft)	(ac-ft)	(kg)	(ac-ft)	(kg)	(ac-ft)	(kg)						
January	0.076	2.94	26.0	2.0	71	5.7	0.01	0.01	7.2	1.3	2.9	104	12	0.093	2.43	21.5	1.1	0.101	81.7	7.72	104	7.82	240	0.185	0.028	0.075	19.0	1.68	69
February	0.075	2.76	24.4	1.8	67	5.4	0.01	0.01	6.7	1.2	2.6	98	11	0.092	2.95	26.1	1.0	0.094	70.8	6.63	98	6.72	231	0.179	0.026	0.075	19.0	1.69	68
March	0.075	4.23	37.4	2.8	102	8.3	0.01	0.01	10.3	1.8	2.9	150	16	0.086	4.38	38.7	1.5	0.143	109.7	10.21	150	10.35	167	0.136	0.037	0.074	18.7	1.71	68
April	0.074	2.74	24.2	1.8	66	5.4	0.01	0.01	6.7	1.2	2.8	97	11	0.093	5.32	47.0	1.0	0.091	49.1	4.53	97	4.62	249	0.191	0.026	0.076	19.1	1.68	69
May	0.076	3.28	29.0	2.2	79	6.4	0.01	0.01	8.0	1.4	2.9	116	13	0.090	5.93	52.4	1.2	0.110	62.7	5.79	116	5.90	215	0.169	0.030	0.075	18.9	1.69	68
June	0.075	7.18	63.4	4.8	174	14.0	0.01	0.01	17.5	3.1	2.8	255	25	0.079	5.36	47.3	2.6	0.242	204.6	19.01	255	19.26	95	0.082	0.058	0.072	18.2	1.75	68
July	0.072	5.86	51.8	3.9	142	11.4	0.01	0.01	14.3	2.5	2.9	208	21	0.081	5.30	46.8	2.1	0.193	158.8	14.44	208	14.63	120	0.102	0.049	0.073	18.4	1.74	68
August	0.073	7.14	63.1	4.8	173	13.9	0.01	0.01	17.4	3.1	2.9	253	25	0.079	5.01	44.3	2.6	0.232	206.3	18.50	253	18.73	99	0.085	0.058	0.072	18.2	1.75	68
September	0.072	6.06	53.5	4.0	147	11.8	0.01	0.01	14.8	2.6	2.8	215	21	0.080	4.40	38.9	2.2	0.197	173.8	15.59	215	15.79	113	0.096	0.050	0.073	18.3	1.74	68
October	0.073	2.87	25.4	1.9	69	5.6	0.01	0.01	7.0	1.2	2.9	102	12	0.093	3.86	34.1	1.0	0.093	66.6	5.97	102	6.06	246	0.188	0.027	0.076	19.1	1.68	69
November	0.076	2.14	18.9	1.4	52	4.2	0.00	0.00	5.2	0.9	2.8	76	9	0.100	2.79	24.6	0.8	0.071	50.4	4.62	76	4.69	319	0.232	0.022	0.077	19.4	1.65	69
December	0.077	2.47	21.8	1.6	60	4.8	0.00	0.00	6.0	1.1	2.9	88	10	0.097	2.25	19.9	0.9	0.084	66.8	6.28	88	6.37	285	0.212	0.024	0.076	19.3	1.67	69
Totals:		49.67	439	33.1	1201	97	0.10	0.10	121	22	34.4	1,761	186	0.089	49.98	441	18.0	1.65	1301	119.29	1,761	120.94	198	0.155	0.43	0.075	18.8	1.70	68

Hick's Ditch BMP Annual TP Removal (kg): 117.0

Phosphorus Sedimentation Coefficient (σ): 0.8